First Grade

Exploring Shapes
Addition and Subtraction Within 20
Math in Focus

Unit 2 Curriculum Guide
November 12, 2018 – February 1, 2019

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

Table of Contents

First Grade Unit II Chapter 5,7,8,9 & Eureka Math Module 2 (TOPIC B,C,D)
In this Unit Students will:
1.OA.1-8 ➢ Solve addition and subtraction situations involving: • Adding to, • Taking From , • Putting Together, • Taking Apart, and • Comparing situations. ➢ Apply the following problem solving strategies • Use of objects and/or drawings • Counting On • Making Ten • Decomposing Numbers • Properties of Operations • Relationship between Addition and Subtraction **1.NBT.1-3** ➢ Count to 120 starting at any number less than 120 ➢ Reade and write numerals ➢ Represent number of objects with a written numeral ➢ Understand the value of a digit within a number ➢ Compare two-digit numbers **1.G.1-3** ➢ Distinguish between defining and non-defining attributes ➢ Compose 2-D and 3-D shapes ➢ Partition circles and rectangles into two and four equal shares ➢ Describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of* ➢ Describe the whole as two of, or four of **Mathematical Practices** ➢ Make sense of persevere in solving them. ➢ Reason abstractly and quantitatively. ➢ Construct viable arguments and critique the reasoning of others. ➢ Model with mathematics. ➢ Use appropriate mathematical tools. ➢ Attend to precision. ➢ Look for and make use of structure. ➢ Look for and express regularity in repeated reasoning.

Unit 2: Exploring Shapes Addition and Subtraction Within 20		
Chapter	**Activity**	**Standard**
MIF **Chapter 5** Shapes and Patterns	Lesson 1 : Exploring Plane Shapes	1.G.1-3
	Lesson 1: Exploring Plane Shapes (Day 2)	
	Lesson 1: Exploring Plane Shapes (Day 3)	
	Lesson 3: Making Pictures and Models with Shapes (Day 1)	1.G.2-3
	Lesson 3: Making Pictures and Models with Shapes (Day 2)	
	Problem- Solving: Put on Your thinking Cap!	1.G.1
MIF **Chapter 7** Numbers to 20	Lesson 1: Counting to 20	1.NBT.1-2
	Lesson 2: Place Value (Day1)	1.NBT.1-2
	Lesson 2: Place Value (Day 2)	
	Lesson 3: Comparing Numbers	1.NBT.1
	Lesson 3: Comparing Numbers (Day 2)	
	Lesson 4: Making Patterns and Ordering Numbers	1.NBT.1-3
MIF **Chapter 8** Addition and Subtraction Facts to 20	Chapter Opener	1.OA.1, 3
	Lesson 1: Ways to add	1.OA.6-8
	Lesson 1: Ways to add (Day 2)	
	Lesson 2: Mental Addition (Day 2)	1.OA.4, 1.OA.6-8
	Lesson 3: Real- World Problems: Addition and Subtraction Facts	1.OA.1-2, 1.OA.4,7

Module 2: Introduction to Place Value through Addition and Subtraction within 20		
Topic	**Lesson**	**Student Lesson Objective/ Supportive Videos**
Topic B: Counting On or Taking from Ten to Solve Result Unknown	Lesson 12& 13	Solve word problems with subtraction of 9 from 10 https://www.youtube.com/watch?v=oo8aEztLMmI
	Lesson 14 & 15	Subtraction of 9 from teen numbers https://www.youtube.com/watch?v
	Lesson 16	Relate counting on to making ten and taking from ten https://www.youtube.com/watch?v
	Lesson 17	Model subtraction of 8 from teen numbers https://www.youtube.com/watch?v
	Lesson 18	Model subtraction of 8 from teen numbers https://www.youtube.com/watch?v
	Lesson 19	Compare the counting on technique and the take from 10 technique https://www.youtube.com/watch?v
	Lesson 20	Subtract 7, 8, and 9 from teen numbers https://www.youtube.com/watch?v
Topic C: Strategies for Solving Change or Addend Unknown Problems	Lesson 22	Solve word problems with unknown addends and relate counting on to the take from ten technique https://www.youtube.com/watch?v
	Lesson 23	Solve word problems with unknown changes involving addition and subtraction https://www.youtube.com/watch?v
	Lesson 25	Use understanding of the equal sign to find two different addends that add up to the same number https://www.youtube.com/watch?v
Topic D: Varied Problems with Decompositions of Teen Numbers as 1 Ten and Some Ones	Lesson 26	Using one ten as a unit to describe teen numbers using the format: one ten, (?) ones https://www.youtube.com/watch?v
	Lesson 27	Solve addition and subtraction problems by thinking of teen numbers as 1 ten and some ones https://www.youtube.com/watch?v
	Lesson 28/29	Solve addition problems using ten as a unit, write two-step solutions https://www.youtube.com/watch?v

Chapter	**Activity**	**Standard**
MIF **Chapter 9** Length	Chapter Opener	1.NBT.3
	Lesson 2: Comparing more than two things	1.MD.1
	Lesson 4: Measuring Things (Day 1)	1.MD.2
	Lesson 4: Measuring Things (Day 2)	
	Lesson 5: Finding Lengths in Units	1.MD.1-2
	Problem Solving	1.MD.1

New Jersey Student Learning Standards: Operations and Algebraic Thinking	
1.OA.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

First grade students extend their experiences in Kindergarten by working with numbers to 20 to solve a new type of problem situation: Compare (See **Table 1** at end of document for examples of all problem types). In a Compare situation, two amounts are compared to find "How many more" or "How many less".

Problem Type: Compare		
Difference Unknown: *"How many more?" version.* Lucy has 7 apples. Julie as 9 apples. How many more apples does Julie have than Lucy?	*Bigger* Unknown: *"More" version suggests operation.* Julie has 2 more apples than Lucy. Lucy has 7 apples. How many apples does Julie have?	Smaller Unknown: *Version with "more"* Mastery expected in Second Grade
"How many fewer?" version Lucy as 7 apples. Julie has 9 apples. How many fewer apples does Lucy have than Julie? 7 + ☐ = 9 9 – 7 = ☐	Bigger Unknown: *Version with "fewer"* Mastery expected in Second Grade	*Smaller* Unknown: *"Fewer" version suggests operation.* Lucy has 2 fewer apples than Julie. Julie has 9 apples. How many apples does Lucy have?

Table 1 Common addition and subtraction situations[1]

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$ **(K)**	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$ **(1st)**	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$ **One-Step Problem** **(2nd)**
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$ **(K)**	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$ **(1st)**	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$ **One-Step Problem** **(2nd)**
	Total Unknown	**Addend Unknown**	**Both Addends Unknown[2]**
Put Together/ Take Apart[3]	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$ **(K)**	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5$, $5 - 3 = ?$ **(K)**	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5$, $5 = 5 + 0$ $5 = 1 + 4$, $5 = 4 + 1$ $5 = 2 + 3$, $5 = 3 + 2$ **(1st)**
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare[4]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? **(1st)**	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? **One-Step Problem** **(1st)**	(Version with "more"): Julie has 3 more apples than Lucy. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?$ $? + 3 = 5$ **One-Step Problem** **(2nd)**
	("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5$, $5 - 2 = ?$ **(1st)**	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?$, $3 + 2 = ?$ **One-Step Problem** **(2nd)**	(Version with "fewer"): Lucy has three fewer apples than Julie. Julie has five apples. How many apples does Lucy have? **One-Step Problem** **(1st)**

K: Problem types to be mastered by the end of the Kindergarten year.

1st: Problem types to be mastered by the end of the First Grade year, including problem types from the previous year(s). However, First Grade students should have experiences with all 12 problem types.

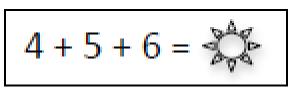
2nd: Problem types to be mastered by the end of the Second Grade year, including problem types from the previous year(s).

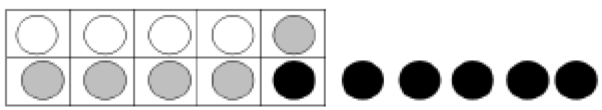
New Jersey Student Learning Standards: Operations and Algebraic Thinking	
1.OA.2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.

First Grade students solve multi-step word problems by adding (joining) three numbers whose sum is less than or equal to 20, using a variety of mathematical representations.

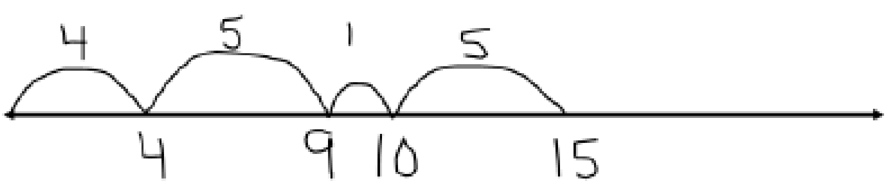
Example:
Mrs. Smith has 4 oatmeal raisin cookies, 5 chocolate chip cookies, and 6 gingerbread cookies. How many cookies does Mrs. Smith have?

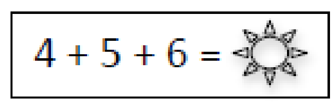
Student A:
I put 4 counters on the Ten Frame for the oatmeal raisin cookies. Then, I put 5 different color counters on the ten frame for the chocolate chip cookies. Then, I put another 6 color counters out for the gingerbread cookies. Only one of the gingerbread cookies fit, so I had 5 leftover. Ten and five more makes 15 cookies. Mrs. Smith has 15 cookies.





Student B*:*
I used a number line. First I jumped to 4, and then I jumped 5 more. That's 9. I broke up 6 into 1 and 5 so I could jump 1 to make 10. Then, I jumped 5 more and got 15. Mrs. Smith has 15 cookies.





Student C:
I wrote: 4 + 5 + 6 = ☐ I know that 4 and 6 equals 10, so the oatmeal raisin and gingerbread equals 10 cookies.
Then I added the 5 chocolate chip cookies. 10 and 5 is 15. So, Mrs. Smith has 15 cookies.

New Jersey Student Learning Standards: Operations and Algebraic Thinking	
1.OA.3	Apply properties of operations as strategies to add and subtract. Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. **(Commutative property of addition.)** To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. **(Associative property of addition.)** Students need not use formal terms for these properties.

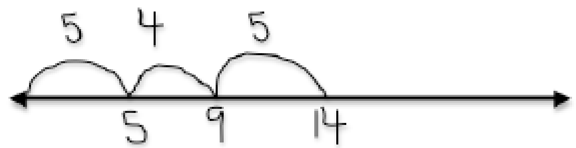
Elementary students often believe that there are hundreds of isolated addition and subtraction facts to be mastered. However, when students understand the commutative and associative properties, they are able to use relationships between and among numbers to solve problems. First Grade students apply properties of operations as strategies to add and subtract. Students do not use the formal terms “commutative” and associative”. Rather, they use the understandings of the commutative and associative property to solve problems.

Commutative Property of Addition	Associative Property of Addition
The order of the addends does not change the sum. For example, if 8 + 2 = 10 is known, then 2 + 8 = 10 is also known.	The grouping of the 3 or more addends does not affect the sum. For example, when adding 2 + 6 + 4, the sum from adding the first two numbers first (2 + 6) and then the third number (4) is the same as if the second and third numbers are added first (6 + 4) and then the first number (2). The student may note that 6+4 equals 10 and add those two numbers first before adding 2. Regardless of the order, the sum remains 12.

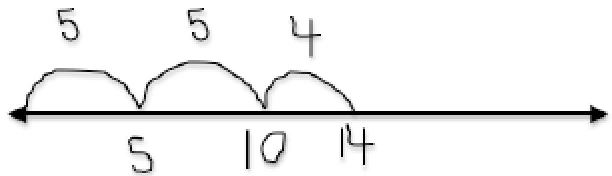
Students use mathematical tools and representations (e.g., cubes, counters, number balance, number line, 100 chart) to model these ideas.

Commutative Property Examples: Cubes
A student uses 2 colors of cubes to make as many different combinations of 8 as possible.
When recording the combinations, the student records that 3 green cubes and 5 blue cubes
equals 8 cubes in all. In addition, the student notices that 5 green cubes and 3 blue cubes also equals 8 cubes.

Associative Property Examples:
Number Line: □= **5 + 4 + 5**
Student A: First I jumped to 5. Then, I jumped 4 more, so I landed on 9. Then I jumped 5 more and landed on 14.



Student B: I got 14, too, but I did it a different way. First I jumped to 5. Then, I jumped 5 again. That's 10. Then, I jumped 4 more. See, 14!



Mental Math: **There are 9 red jelly beans, 7 green jelly beans, and 3 black jelly beans. How many jelly beans are there in all?**
Student: "I know that 7 + 3 is 10. And 10 and 9 is 19. There are 19 jelly beans."

1.OA.4	Understand subtraction as an unknown-addend problem

First Graders often find subtraction facts more difficult to learn than addition facts. By understanding the relationship between addition and subtraction, First Graders are able to use various strategies described below to solve subtraction problems.

For Sums to 10

*<u>Think-Addition:</u>
Think-Addition uses known addition facts to solve for the unknown part or quantity within a problem. When students use this strategy, they think, "What goes with this part to make the total?" The think-addition strategy is particularly helpful for subtraction facts with sums of 10 or less and can be used for sixty-four of the 100 subtraction facts. Therefore, in order for think-addition to be an effective strategy, students must have mastered addition facts first.

For example, when working with the problem 9 - 5 = □, First Graders think “Five and what makes nine?”, rather than relying on a counting approach in which the student counts 9, counts off 5, and then counts what’s left. When subtraction is presented in a way that encourages students to think using addition, they use known addition facts to solve a problem.

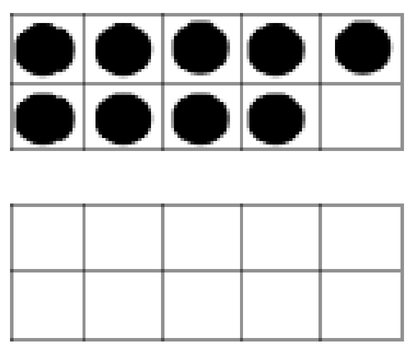
Example: 10 - 2 = □
Student: “2 and what make 10? I know that 8 and 2 make 10. So, 10 - 2 = 8.”

For Sums Greater than 10
The 36 facts that have sums greater than 10 are often considered the most difficult for students to master. Many students will solve these particular facts with Think-Addition (described above), while other students may use other strategies described below, depending on the fact. Regardless of the strategy used, all strategies focus on the relationship between addition and subtraction and often use 10 as a benchmark number.

***Build Up Through 10:**
This strategy is particularly helpful when one of the numbers to be subtracted is 8 or 9. Using 10 as a bridge, either 1 or 2 are added to make 10, and then the remaining amount is added for the final sum.

Example: 15 -9 = □
Student A: “I’ll start with 9. I need one more to make 10. Then, I need 5 more to make 15. That’s 1 and 5- so it’s 6. 15 0 9 = 6.”

Student B: “I put 9 counters on the 10 frame. Just looking at it I can tell that I need 1 more to get to 10. Then I need 5 more to get to 15. So, I need 6 counters.”



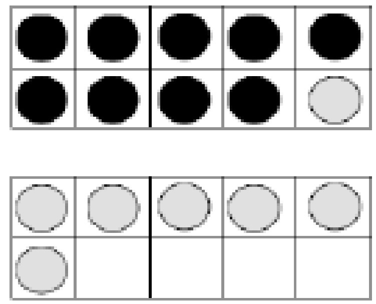
Back Down Through 10

This strategy uses take-away and 10 as a bridge. Students take away an amount to make 10, and then take away the rest. It is helpful for facts where the ones digit of the two-digit number is close to the number being subtracted.

Example: 16 – 7 = □

Student A: "I'll start with 16 and take off 6. That makes 10. I'll take one more off and that makes 9. 16 – 7 = 9."

Student B: "I used 16 counters to fill one ten frame completely and most of the other one. Then, I can take these 6 off from the 2nd ten frame. Then, I'll take one more from the first ten frame. That leaves 9 on the ten frame."



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 (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

In First Grade, students learn about and use various strategies to solve addition and subtraction problems. When students repeatedly use strategies that make sense to them, they internalize facts and develop fluency for addition and subtraction within 10. When students are able to demonstrate fluency within 10, they are accurate, efficient, and flexible. First Graders then apply similar strategies for solving problems within 20, building the foundation for fluency to 20 in Second Grade.

Developing Fluency for Addition & Subtraction within 10

Example: **Two frogs were sitting on a log. 6 more frogs hopped there. How many frogs are sitting on the log now?**

Counting- On	Internalized Fact
I started with 6 frogs and then counted up, Sixxxx.... 7, 8. So there are 8 frogs on the log. 6 + 2 = 8	There are 8 frogs on the log. I know this because 6 plus 2 equals 8. 6 + 2 = 8

Add and Subtract within 20

Example: **Sam has 8 red marbles and 7 green marbles. How many marbles does Sam have in all?**

Making 10 and Decomposing a Number	Creating an Easier Problem with Known Sums
I know that 8 plus 2 is 10, so I broke up (decomposed) the 7 up into a 2 and a 5. First I added 8 and 2 to get 10, and then added the 5 to get 15. 7 = 2 + 5 8 + 2 = 10 10 + 5 = 15	I broke up (decomposed) 8 into 7 and 1. I know that 7 and 7 is 14. I added 1 more to get 15. 8 = 7 + 1 7 + 7 = 14 14 + 1 = 15

Example: **There were 14 birds in the tree. 6 flew away. How many birds are in the tree now?**

Back Down Through Ten	Relationship between Addition & Subtraction
I know that 14 minus 4 is 10. So, I broke the 6 up into a 4 and a 2. 14 minus 4 is 10. Then I took away 2 more to get 8. 6 = 4 + 2 14 – 4 = 10 10 – 2 = 8	I thought, '6 and what makes 14?'. I know that 6 plus 6 is 12 and two more is 14. That's 8 altogether. So, that means that 14 minus 6 is 8. 6 + 8 = 14 14 – 6 = 8

1.OA.7	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.

In order to determine whether an equation is true or false, First Grade students must first understand the meaning of the equal sign. This is developed as students in Kindergarten and First Grade solve numerous joining and separating situations with mathematical tools, rather than symbols. Once the concepts of joining, separating, and "the same amount/quantity as" are developed concretely, First Graders are ready to connect these experiences to the corresponding symbols (+, -, =). Thus, students learn that the equal sign does not mean "the answer comes next", but that the symbol signifies an equivalent relationship that the left side 'has the same value as' the right side of the equation.

When students understand that an equation needs to "balance", with equal quantities on both sides of the equal sign, they understand various representations of equations, such as:
- an operation on the left side of the equal sign and the answer on the right side (5 + 8 = 13)
- an operation on the right side of the equal sign and the answer on the left side (13 = 5 + 8)
- numbers on both sides of the equal sign (6 = 6)
- operations on both sides of the equal sign (5 + 2 = 4 + 3).

Once students understand the meaning of the equal sign, they are able to determine if an equation is true (9 = 9) or false (9 = 8).

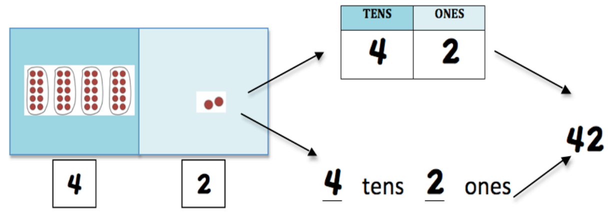
1.OA.8	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ – 3, 6 + 6 = _.

First Graders use their understanding of and strategies related to addition and subtraction as described in 1.OA.4 and 1.OA.6 to solve equations with an unknown. Rather than symbols, the unknown symbols are boxes or pictures.

Example: **Five cookies were on the table. I ate some cookies. Then there were 3 cookies. How many cookies did I eat?**
Student A: What goes with 3 to make 5? 3 and 2 is 5. So, 2 cookies were eaten.
Student B: Fiiivee, four, three (*holding up 1 finger for each count*). 2 cookies were eaten (*showing 2 fingers*).
Student C: We ended with 3 cookies. Threeeee, four, five (*holding up 1 finger for each count*). 2 cookies were eaten (*showing 2 fingers*).

Example: **Determine the unknown number that makes the equation true. 5 - □= 2**

Student: 5 minus something is the same amount as 2. Hmmm. 2 and what makes 5? 3! So, 5 minus 3 equals 2. Now it's true!	
1.NBT.1	Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
• Count on from a number ending at any number up to 120. • Recognize and explain patterns with numerals on a hundreds chart. • Understand that the place of a digit determines its value. For example, students recognize that 24 is different from and less than 42.) • Explain their thinking with a variety of examples. • Read and write numerals to 120. Students extend the range of counting numbers, focusing on the patterns evident in written numerals. This is the foundation for thinking about place value and the meaning of the digits in a numeral. Students are also expected to read and write numerals to 120.	
1.NBT.2	Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones- called a "ten" c.The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones)
First Grade students are introduced to the idea that a bundle of ten ones is called a "ten". This is known as "unitizing". When first grade students unitize a group of ten as a whole unit ("a ten"), they are able to count groups as though they were individual objects. This is a monumental shift in thinking and can often be challenging young children to consider a group of something as "one" when all previous experiences have been counting single objects. This is the foundation of the place value system and requires time and rich experiences with concrete manipulatives to develop.	



Make sure to reinforce the concept that 4 tens is the same as 40. Students should be asked to represent both ways. The use of hide zero cards will help solidify this thinking.

A student's ability to conserve number is an important aspect of this standard. Therefore, first graders require ample time grouping proportional objects (e.g., cubes, beans, bead, ten-frames) to make groups of ten, rather than using only pre-grouped materials (e.g., Base 10 Blocks, pre-made ben sticks) that have to be "traded" or are non-proportional (e.g., money, place value disks)

Students should explore the idea that decade numbers (e.g 10, 20, 30, 40,etc) are groups of ten with no left over ones.

It is best to make a ten with unifix cubes or other materials that students can group.

As students are representing the various amounts, it is important that an emphasis is placed on the language associated with the quantity.

1.NBT.3	Compare two two-digit numbers based on meanings of the ten and ones digits, recording the results of comparisons with the symbols <,>,=

First Graders use their understanding of groups and order digits to compare two numbers by examining the amount of tens and ones in each number
Students are introduced to the symbols greater than (>), less than (<) and equal to (=)

Language such as "The alligator eats the bigger number" is <u>not mathematical</u> and should be avoided

Students should have ample experiences communicating their comparisons using words, models and in context before using only symbols in this standard.
Example: 42 _45

<u>Student</u>: 42 has 4 tens and 2 ones. 45 has 4 tens and 5 ones. They have the same number of tens but 45 has more ones than 42. So,

45 is greater than 42. So 42<45.

1.MD.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.

Teach students to first predict by estimating how long or how tall an object will be

Students continue to use direction comparison to compare lengths using non-standard units.

Direct comparison means that students compare the amount of an attribute in two objects without using formal measurement units like paper clips, cubes, string and similar items.

Example: Who is taller?

Student 1 Let's stand back to back and compare our heights. Look! I'm taller!

In Grade 1, measurement experiences are extended to include direct comparisons-using a third object as a comparison tool for length (transitivity)

Example: If the length of object A is greater than the length of object B, and the length of object B is greater than the length of object C, then the length of object A is greater than the length of object C.

Provide problem-solving experiences for students to share their thinking and reasoning ordering a set of objects by length.

Example: The snake handler is trying to put the snakes in order from shortest to longest. Here are the three snakes (3 strings of different length and color) What order should she put the snakes?

Student: Ok. I will lay the snakes next to each other. I need to make sure to be careful and line them up so they all start at the same place. So, the blue snake is the shortest. The green snake is the longest. And the red snake is the medium-sized. So, I'll put them in order from shortest to longest: blue, red, green

1.MD.2	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measure is spanned by a whole number of length units with no gaps or overlaps.

Students gain their first experience with measuring length as the iteration of a smaller, uniform length called a length unit.

Students learn that measuring the length of an object in this way requires placing length units (manipulatives of the same size) end to end without gaps or overlaps, and then counting the number of units to determine the length.

The Geometric Measurement Progression recommends beginning with actual standard units (e.g., 1-inch cubes or centimeter cubes, referred to as length units) to measure length.

This standard limit measurement to whole numbers of length, though not all objects will measure to an exact whole unit. Students will need to adjust their answers because of this.

Example: if a pencil actually measures between 6 and 7centimeter cubes long, the students could state the pencil is "about [6 or 7] centimeter cubes long"; they would choose the closer of the two numbers.

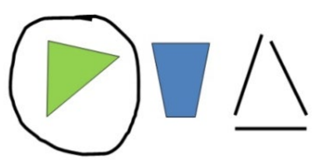
1.G.1	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.

First Grade students use their beginning knowledge of defining and non-defining attributes of shapes to identify, name, build and draw shapes (including triangles, squares, rectangles, and trapezoids). They understand that defining attributes are always-present features that classify a particular object (e.g., number of sides, angles, etc.). They also understand that non-defining attributes are features that may be present, but do not identify what the shape is called (e.g., color, size, orientation, etc.).

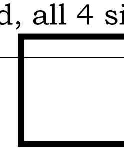
Example: All triangles must be closed figures and have 3 sides. These are defining attributes.

Triangles can be different colors, sizes and be turned in different directions. These are non-defining attributes.

<u>Student:</u> I know that this shape is a triangle because it has 3 sides. It's also closed, not open.



<u>Student:</u> I used toothpicks to build a square. I know it's a square because it has 4 sides. And, all 4 sides are the same size.



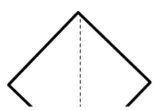
Students should explain and draw the difference between closed and unclosed figures

1.G.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.[1] Students do not need to learn formal names such as "right rectangular prism

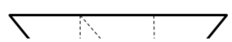
As first graders create composite shapes, a figure made up of two or more geometric shapes, they begin to see how shapes fit together to create different shapes. They also begin to notice shapes within an already existing shape. They may use such tools as pattern blocks, tangrams, attribute blocks, or virtual shapes to compose different shapes.

Example: **What shapes can you create with triangles?**

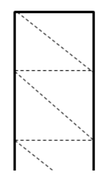
Student A: I made a square. I used 2 triangles.



Student B: I made a trapezoid. I used 4 triangles.



Student C: I made a tall skinny rectangle. I used 6 triangles.



First graders learn to perceive a combination of shapes as a single new shape (e.g., recognizing that two isosceles triangles can be combined to make a rhombus, and simultaneously seeing the rhombus and the two triangles). Thus, they develop competencies that include:

- Solving shape puzzles
- Constructing designs with shapes
- Creating and maintaining a shape as a unit

The ability to describe, use and visualize the effect of composing and decomposing shapes is an important mathematical skill. It isn't only relevant to geometry, <u>but it is related to children's ability to compose and decompose numbers.</u> As students combine shapes, they continue to develop their sophistication in describing geometric attributes and properties and determining how shapes are alike and different, building foundations for measurement and initial understandings of properties such as congruence and symmetry.(*Progressions for the CCSS in Mathematics: Geometry*, The Common Core Standards Writing Team, June 2012)

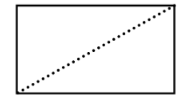
1.G.3	Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

First Graders begin to partition regions into equal shares using a context (e.g., cookies, pies, pizza). This is a foundational building block of fractions, which will be extended in future grades. Through ample experiences with multiple representations, students use the words, halves, fourths, and quarters, and the phrases half of, fourth of, and quarter of to describe their thinking and solutions. Working with the "the whole", students understand that "the whole" is composed of two halves, or four fourths or four quarters.

Students need many experiences with different sized circles and rectangles to recognize that when they cut something into two equal pieces, each piece will equal one half of its original whole. Children should recognize that halves of two different wholes are not necessarily the same size. Also they should reason that decomposing equal shares into more equal shares results in smaller equal shares.

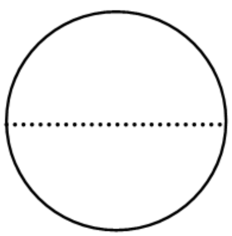
Example: How can you and a friend share equally (partition) this piece of paper so that you both have the same amount of paper to paint a picture?

<u>Student 1</u>	<u>Student 2</u>
I would split the paper right down the middle. That gives us 2 halves. I have half of the paper and my friend has the other half of the paper.	I would split it from corner to corner (diagonally). She gets half of the paper and I get half of the paper. See, if we cut on the line, the parts are the same size.



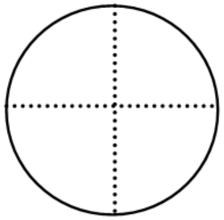
Example: Let's take a look at this pizza.

Teacher: There is pizza for dinner. What do you notice about the slices on the pizza?



Student: There are two slices on the pizza. Each slice is the same size. Those are big slices!

Teacher: If we cut the same pizza into four slices (fourths), do you think the slices would be the same size, larger, or smaller as the slices on this pizza?



Student: When you cut the pizza into fourths, the slices are smaller than the other pizza. More slices mean that the slices get smaller and smaller. I want a slice from that first pizza!

Math In Focus Lesson Structure

	LESSON STRUCTURE	RESOURCES	COMMENTS
PRE TEST	**Chapter Opener** Assessing Prior Knowledge *The Pre Test serves as a diagnostic test of readiness of the upcoming chapter*	**Teacher Materials** Quick Check Pre-Test (Assessment Book) Recall Prior Knowledge **Student Materials** Student Book (Quick Check); Copy of the Pre Test; Recall prior Knowledge	Recall Prior Knowledge (RPK) can take place just before the pre-tests are given and can take 1-2 days to front load prerequisite understanding Quick Check can be done in concert with the RPK and used to repair student misunderstandings and vocabulary prior to the pre-test ; Students write Quick Check answers on a separate sheet of paper Quick Check and the Pre Test can be done in the same block *(See Anecdotal Checklist; Transition Guide)* Recall Prior Knowledge – Quick Check – Pre Test
DIRECT ENGAGEMENT	**Direct Involvement/Engagement** Teach/Learn *Students are directly involved in making sense, themselves, of the concepts – by interacting the tools, manipulatives, each other, and the questions*	**Teacher Edition** 5-minute warm up Teach; Anchor Task **Technology** Digi **Other** Fluency Practice	The Warm Up activates prior knowledge for each new lesson Student Books are CLOSED; Big Book is used in Gr. K Teacher led; Whole group Students use concrete manipulatives to explore concepts A few select parts of the task are explicitly shown, but the majority is addressed through the hands-on, constructivist approach and questioning Teacher facilitates; Students find the solution
GUIDED LEARNING	**Guided Learning and Practice** Guided Learning	**Teacher Edition** Learn **Technology** Digi **Student Book** Guided Learning Pages Hands-on Activity	Students-already in pairs /small, homogenous ability groups; Teacher circulates between groups; Teacher, anecdotally, captures student thinking **Small Group w/Teacher circulating among groups** Revisit Concrete and Model Drawing; Reteach Teacher spends majority of time with struggling learners; some time with on level, and less time with advanced groups Games and Activities can be done at this time

INDEPENDENT PRACTICE	**Independent Practice** *A formal formative assessment*	**Teacher Edition** Let's Practice **Student Book** Let's Practice **Differentiation Options** All: Workbook Extra Support: Reteach On Level: Extra Practice Advanced: Enrichment	**Let's Practice** determines readiness for Workbook and small group work and is used as formative assessment; Students not ready for the Workbook will use Reteach. The Workbook is continued as Independent Practice. Manipulatives **CAN** be used as a communications tool as needed. Completely Independent On level/advance learners should finish all workbook pages.
ADDITIONAL PRACTICE	**Extending the Lesson**	Math Journal Problem of the Lesson Interactivities Games	
	Lesson Wrap Up	Problem of the Lesson Homework (Workbook , Reteach, or Extra Practice)	Workbook or Extra Practice Homework is only assigned when students fully understand the concepts (as additional practice) Reteach Homework (issued to struggling learners) should be checked the next day
POST TEST	**End of Chapter Wrap Up and Post Test**	**Teacher Edition** Chapter Review/Test Put on Your Thinking Cap **Student Workbook** Put on Your Thinking Cap **Assessment Book** Test Prep	Use Chapter Review/Test as "review" for the End of Chapter Test Prep. Put on your Thinking Cap prepares students for novel questions on the Test Prep; Test Prep is graded/scored. The Chapter Review/Test can be completed • Individually (e.g. for homework) then reviewed in class • As a 'mock test' done in class and doesn't count • As a formal, in class review where teacher walks students through the questions Test Prep is completely independent; scored/graded Put on Your Thinking Cap (green border) serve as a capstone problem and are done just before the Test Prep and should be treated as Direct Engagement. By February, students should be doing the Put on Your Thinking Cap problems on their own

Math Background:

- Children have learned in Kindergarten to identify, name, and describe a variety of plane shapes such as circles, squares, triangles, and rectangles. The mathematical concepts in geometry can be related to objects in the real world, so children are encouraged to use basic shapes and spatial reasoning to model objects in their environment.
- Children will learn how to count, read, and write numbers within 20. This involves counting on from 10.
- Children's understanding of the number concepts in this chapter will be applied to comparing numbers to build number relationships.
- The strategy of using double facts is introduced at this stage, and leads to a related strategy, doubles plus one facts.
- Number bonds have the added benefit of displaying fact families. Since addition and subtraction are inverse operations, there are families of facts that relate addition and subtraction facts around two parts and a whole.
- As children progress to measuring length, the basic idea is to determine how many times a specific unit fits the object to be measured.

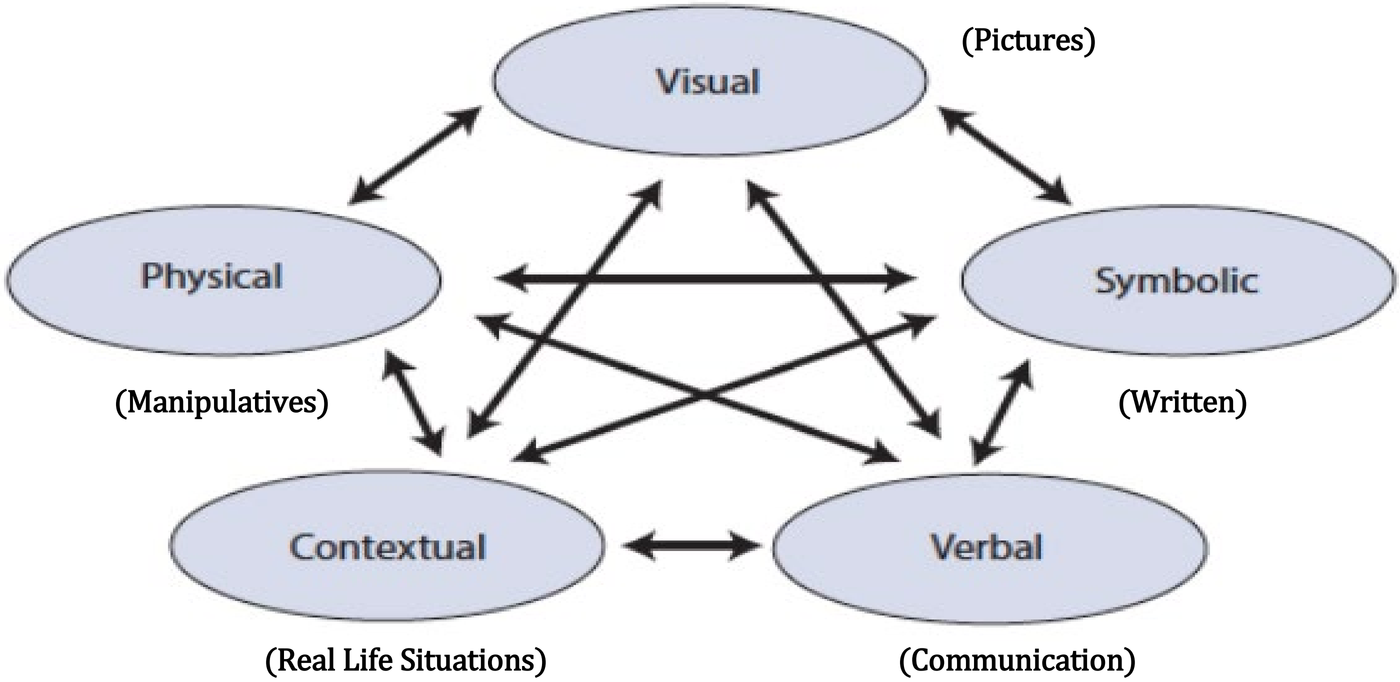
Misconceptions:

- The terms closed and unclosed figures may confuse student.
- Some students have difficulty visualizing filling in shape puzzles. Some students may not notice that two triangles make a rectangle. To help address this misconception, provide additional experiences for students to fill in shape puzzles with pattern blocks or tangrams.
- Continue to watch for students who reverse digits. These students need more opportunities to decompose numbers into groups of tens and ones using concrete materials and then to put the items in the correct places on a place value chart.
- Students who recognize two-digit numbers but do not understand that the position of the digit determines its value need additional work with concrete representations.
- Students may incorrectly align objects to be measured. This may result in an inaccurate comparison of three items.
- Some students may leave a gap or space or overlap as the units are placed next to an item. Some students may simply think about measurement as merely a counting task.
- Continue to watch for students who are double counting a number when adding or subtracting.
- Although subtraction is not commutative, it is important not to contribute to a potential student misconception by saying that you cannot take a larger number from a smaller number.

PARCC Assessment Evidence/Clarification Statements			
CCSS	**Evidence Statement**	**Clarification**	**Math Practices**
1.OA.A.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart and comparing, with unknown in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	i) Tasks should include all problem situations and all of their subtypes and language variants. Mastery is expected in "Add To" and "Take From" - Result and Change Unknown Problems, "Put Together/Take Apart" Problems, "Compare" – Difference Unknown, Bigger Unknown (more version) and Smaller Unknown (fewer version) Problems (for more information see CCSS Table 1 and OA Progression, p. 9.) ii) Interviews (individual or small group) are used to assess mastery of different problem types.	MP 1, 4
1.OA.B.3	Apply properties of operations as strategies to add and subtract. Examples: if 8+3 = 11 is known, then 3+8 = 11 is also known (Commutative property of addition). To add 2+6+4, the second two numbers can be added to make a ten, so 2+6+4 = 2+10 = 12 (Associative property of addition).	i)Tasks should not expect students to know the names of the properties. ii) Interviews (individual or small group) should target students' application of properties of operations to add and subtract.	MP 7,8
1.OA.D.7	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8-1, 5+2=2+5, 4+1=5+2.	i) Interviews (individual or small group) should target students' understanding of the equal sign.	MP 7,8
1.OA.D.8	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations	i) Interviews (individual or small group) should target students' thinking strategies for determining the unknown in an addition or subtraction equation relating 3 whole numbers. Thinking strategies expected in Grade 1 (Level 2 and 3)	MP 7,8

	8+?=11, 5=?-3, 6+6=?.	are defined in 1.OA.6 and in OA Progression	
1.NBT.2-1	Understand that the two digits of a two-digit number represent amounts of tens and ones.	i)Tasks should focus on the understanding of two-digit numbers as some number of “tens” and some number of “ones.” ii) Interviews (individual or small group) should target this understanding	MP 7,8
1.NBT.2-2	Understand that 10 can be thought of as a bundle of ten ones — called a “ten.”.	i)Tasks should focus on the understanding of ten “ones” as a unit of one “ten.” ii) Interviews (individual or small group) should target this understanding.	MP 7,8

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 both how a problem was 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.

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

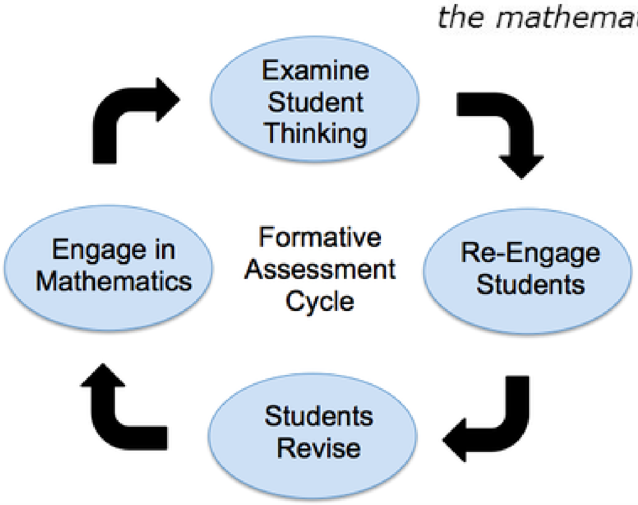
To be mathematically proficient, a student must have:

- 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 1 Assessment / Authentic Assessment Framework

Assessment	CCSS	Estimated Time	Format
Chapter 5			
Optional Chapter 5 Test	1.G.1-3	1 block	Individual
Chapter 7			
Optional Chapter 7 Test	1.NBT.1-3	1 block	Individual
Chapter 8			
Optional Chapter 8 Test	1.OA.1-8	1 block	Individual
Authentic Assessment #2	1.OA.7	½ block	Individual
Chapter 9			
Optional Chapter 9 Test	1.MD.1-2	1 block	Individual
Eureka Math Module 2: Addition and Subtraction within 20 (Topic B,C,D)			
Optional End of Module Assessment	1.OA.1-4, 6 1.NBT.2	1block	Individual
Grade 1 Interim Assessment 2	1.G.1-3 1.NBT.1-3 1.OA.1-8 1.MD.1-2	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 develop in their students.	
1	**Make sense of problems and persevere in solving them**
	Mathematically proficient students in First Grade continue to develop the ability to focus attention, test hypotheses, take reasonable risks, remain flexible, try alternatives, exhibit self-regulation, and persevere (Copley, 2010). As the teacher uses thoughtful questioning and provides opportunities for students to share thinking, First Grade students become conscious of what they know and how they solve problems. They make sense of task-type problems, find an entry point or a way to begin the task, and are willing to try other approaches when solving the task. They ask themselves, "Does this make sense?" First Grade students' conceptual understanding builds from their experiences in Kindergarten as they continue to rely on concrete manipulatives and pictorial representations to solve a problem, eventually becoming fluent and flexible with mental math as a result of these experiences..
2	**Reason abstractly and quantitatively**

	Mathematically proficient students in First Grade recognize that a number represents a specific quantity. They use numbers and symbols to represent a problem, explain thinking, and justify a response. For example, when solving the problem: “There are 60 children on the playground. Some children line up. There are 20 children still on the playground. How many children lined up?” first grade students may write 20 + 40 = 60 to indicate a Think-Addition strategy. Other students may illustrate a counting-on by tens strategy by writing 20 + 10 + 10 + 10 + 10 = 60. The numbers and equations written illustrate the students’ thinking and the strategies used, rather than how to simply compute, and how the story is decontextualized as it is represented abstractly with symbols.
3	**Construct viable arguments and critique the reasoning of others**
	Mathematically proficient students in First Grade continue to develop their ability to clearly express, explain, organize and consolidate their math thinking using both verbal and written representations. Their understanding of grade appropriate vocabulary helps them to construct viable arguments about mathematics. For example, when justifying why a particular shape isn’t a square, a first grade student may hold up a picture of a rectangle, pointing to the various parts, and reason, “It can’t be a square because, even though it has 4 sides and 4 angles, the sides aren’t all the same size.” In a classroom where risk-taking and varying perspectives are encouraged, mathematically proficient students are willing and eager to share their ideas with others, consider other ideas proposed by classmates, and question ideas that don’t seem to make sense.
4	**Model with mathematics**
	Mathematically proficient students in First Grade model real-life mathematical situations with a number sentence or an equation, and check to make sure that their equation accurately matches the problem context. They also use tools, such as tables, to help collect information, analyze results, make conclusions, and review their conclusions to see if the results make sense and revising as needed.
5	**Use appropriate tools strategically**
	Mathematically proficient students in First Grade have access to a variety of concrete (e.g. 3-dimensional solids, ten frames, number balances, number lines) and technological tools (e.g., virtual manipulatives, calculators, interactive websites) and use them to investigate mathematical concepts. They select tools that help them solve and/or illustrate solutions to a problem. They recognize that multiple tools can be used for the same problem- depending on the strategy used. For example, a child who is in the counting stage may choose connecting cubes to solve a problem. While, a student who understands parts of number, may solve the same problem using ten-frames to decompose numbers rather than using individual connecting cubes. As the teacher provides numerous opportunities for students to use educational materials, first grade students’ conceptual understanding and higher order thinking skills are developed

	Attend to precision
6	Mathematically proficient students in First Grade attend to precision in their communication, calculations, and measurements. They are able to describe their actions and strategies clearly, using grade-level appropriate vocabulary accurately. Their explanations and reasoning regarding their process of finding a solution becomes more precise. In varying types of mathematical tasks, first grade students pay attention to details as they work. For example, as students' ability to attend to position and direction develops, they begin to notice reversals of numerals and self-correct when appropriate. When measuring an object, students check to make sure that there are not any gaps or overlaps as they carefully place each unit end to end to measure the object (iterating length units). Mathematically proficient first grade students understand the symbols they use (=, >, 3, a proficient student who is able to attend to precision states, "Four is more than 3" rather than "The alligator eats the four. It's bigger."
	Look for and make use of structure
7	Mathematically proficient students in First Grade carefully look for patterns and structures in the number system and other areas of mathematics. For example, while solving addition problems using a number balance, students recognize that regardless whether you put the 7 on a peg first and then the 4, or the 4 on first and then the 7, they both equal 11 (commutative property). When decomposing two-digit numbers, students realize that the number of tens they have constructed 'happens' to coincide with the digit in the tens place. When exploring geometric properties, first graders recognize that certain attributes are critical (number of sides, angles), while other properties are not (size, color, orientation)
	Look for and express regularity in repeated reasoning
8	Mathematically proficient students in First Grade begin to look for regularity in problem structures when solving mathematical tasks. For example, when adding three one-digit numbers and by making tens or using doubles, students engage in future tasks looking for opportunities to employ those same strategies. Thus, when solving 8+7+2, a student may say, "I know that 8 and 2 equal 10 and then I add 7 more. That makes 17. It helps to see if I can make a 10 out of 2 numbers when I start." Further, students use repeated reasoning while solving a task with multiple correct answers. For example, in the task "There are 12 crayons in the box. Some are red and some are blue. How many of each could there be?" First Grade students realize that the 12 crayons could include 6 of each color (6+6 = 12), 7 of one color and 5 of another (7+5 = 12), etc. In essence, students repeatedly find numbers that add up to 12.

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.

1st & 2nd Grade Ideal Math Block

FLUENCY: Partner/Small Group

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

LAUNCH: Whole Group

Anchor Task: Math In Focus Learn

EXPLORATION: Partner / Small Group

Math In Focus Hands-On, Guided Practice, Let's Explore

INDEPENDENT PRACTICE: Individual

Math In Focus Let's Practice, Workbook, Reteach, Extra Practice, Enrichment

MATH WORKSTATIONS: Pairs / Small Group/ Individual — 15-20 min.

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

Small Group Instruction	Technology Lab	Problem Solving Lab	Fluency Lab	Math Journal Lab

SUMMARY: Whole Group

Lesson Closure: Student Reflection; Real Life Connections to Concept

EXIT TICKET (DOL): Individual — 5 min.

Students complete independently; Used to guide instructional decisions; Used to set instructional goals for students;

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.

First Grade 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**

True or False

Look at each equation. Tell if the equation is true or false by circling the word. Explain your reasoning with pictures, numbers, or words.

$4 + 1 = 5 + 2$ True False	$3 + 8 = 8 + 3$ True False
$9 = 11 - 2$ True False	$8 = 7 - 1$ True False

1.OA.7: Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.

Mathematical Practices:

Individual

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Student correctly answers and clearly constructs and communicates a complete response based on explanations/reasoning using : • Concepts of equality • Strategies based the relationship between addition and subtraction Response includes an **efficient** and logical progression of steps. Strategy and execution meet the content, process, and qualitative demands of the task or concept. Student can communicate ideas.	Student correctly answers and clearly constructs and communicates a complete response with one minor calculation error based on explanations/reasoning using: • Concepts of equality • Strategies based the relationship between addition and subtraction Response includes a **logical** progression of steps May have minor errors that do not impact the mathematics.	Student answers, clearly constructs, and communicates a complete response with minor calculation errors based on explanations/reasoning using: • Concepts of equality • Strategies based the relationship between addition and subtraction Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	The task is attempted and some mathematical effort is made. There may be fragments of accomplishment but little success. • Concepts of equality • Strategies based the relationship between addition and subtraction Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification. Further teaching is required.

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** .

Resources

Think Central: **https://www-k6.thinkcentral.com/ePC/start.do**

Engage NY
http://www.engageny.org/video-library?f[0]=im_field_subject%3A19

Common Core Tools
http://commoncoretools.me/
http://www.ccsstoolbox.com/
http://www.achievethecore.org/steal-these-tools

Achieve the Core
http://achievethecore.org/dashboard/300/search/6/1/0/1/2/3/4/5/6/7/8/9/10/11/12

Manipulatives
http://nlvm.usu.edu/en/nav/vlibrary.html
http://www.explorelearning.com/index.cfm?method=cResource.dspBrowseCorrelations&v=s&id=USA-000
http://www.thinkingblocks.com/

Illustrative Math Project :http://illustrativemathematics.org/standards/k8

Inside Mathematics: http://www.insidemathematics.org/index.php/tools-for-teachers

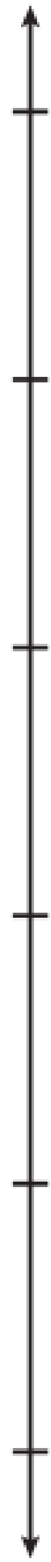
Sample Balance Math Tasks: http://www.nottingham.ac.uk/~ttzedweb/MARS/tasks/

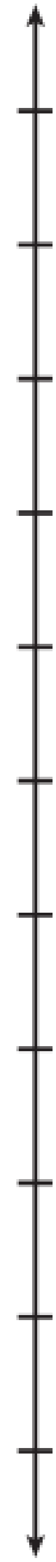
Georgia Department of Education:https://www.georgiastandards.org/Common-Core/Pages/Math-K-5.aspx
Gates Foundations Tasks:http://www.gatesfoundation.org/college-ready-education/Documents/supporting-instruction-cards-math.pdf

Minnesota STEM Teachers' Center: http://www.scimathmn.org/stemtc/frameworks/721-proportional-relationships

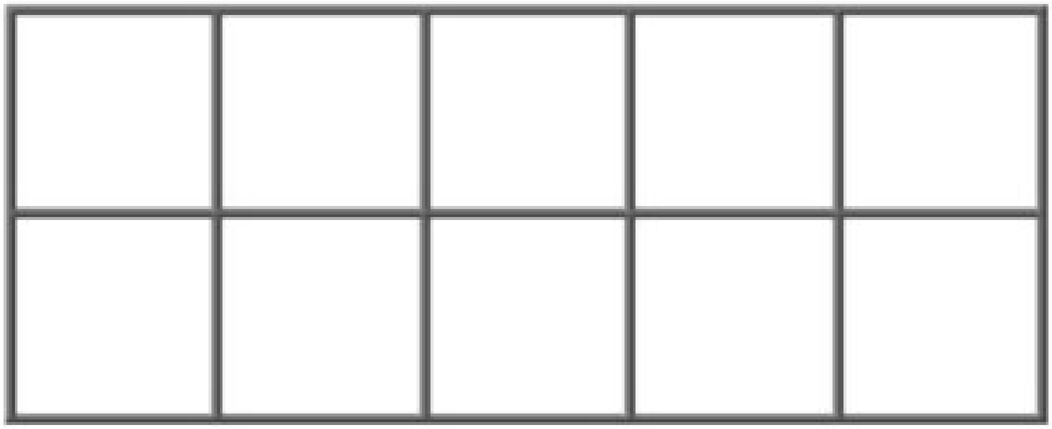
Singapore Math Tests K-12: http://www.misskoh.com

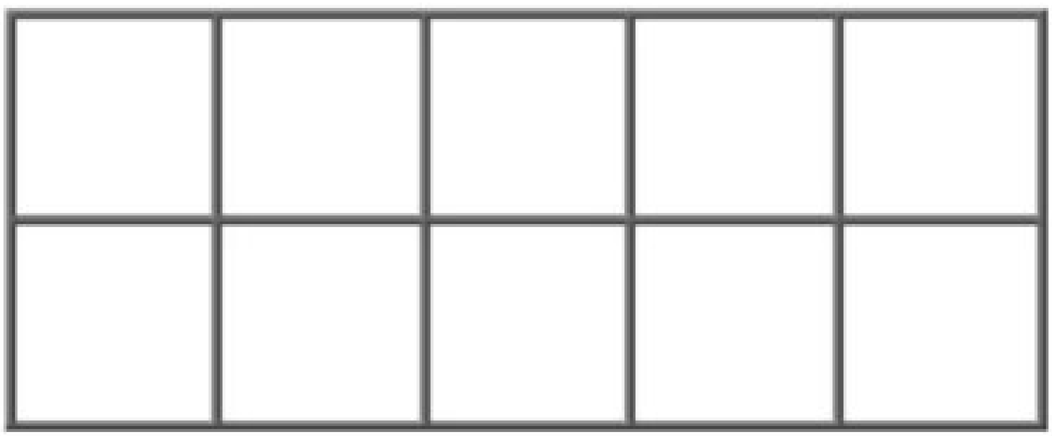
Mobymax.com: http://www.mobymax.com

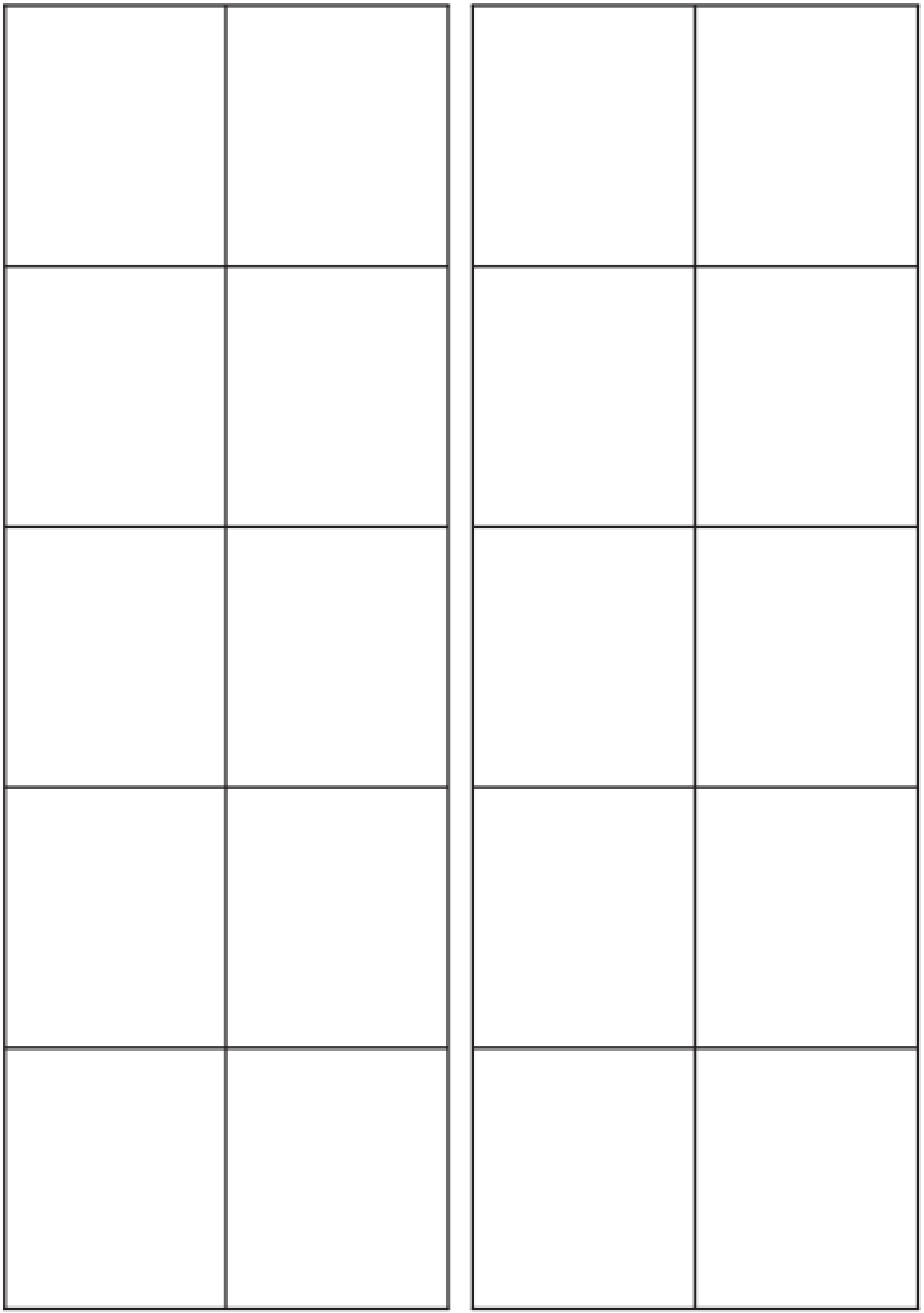


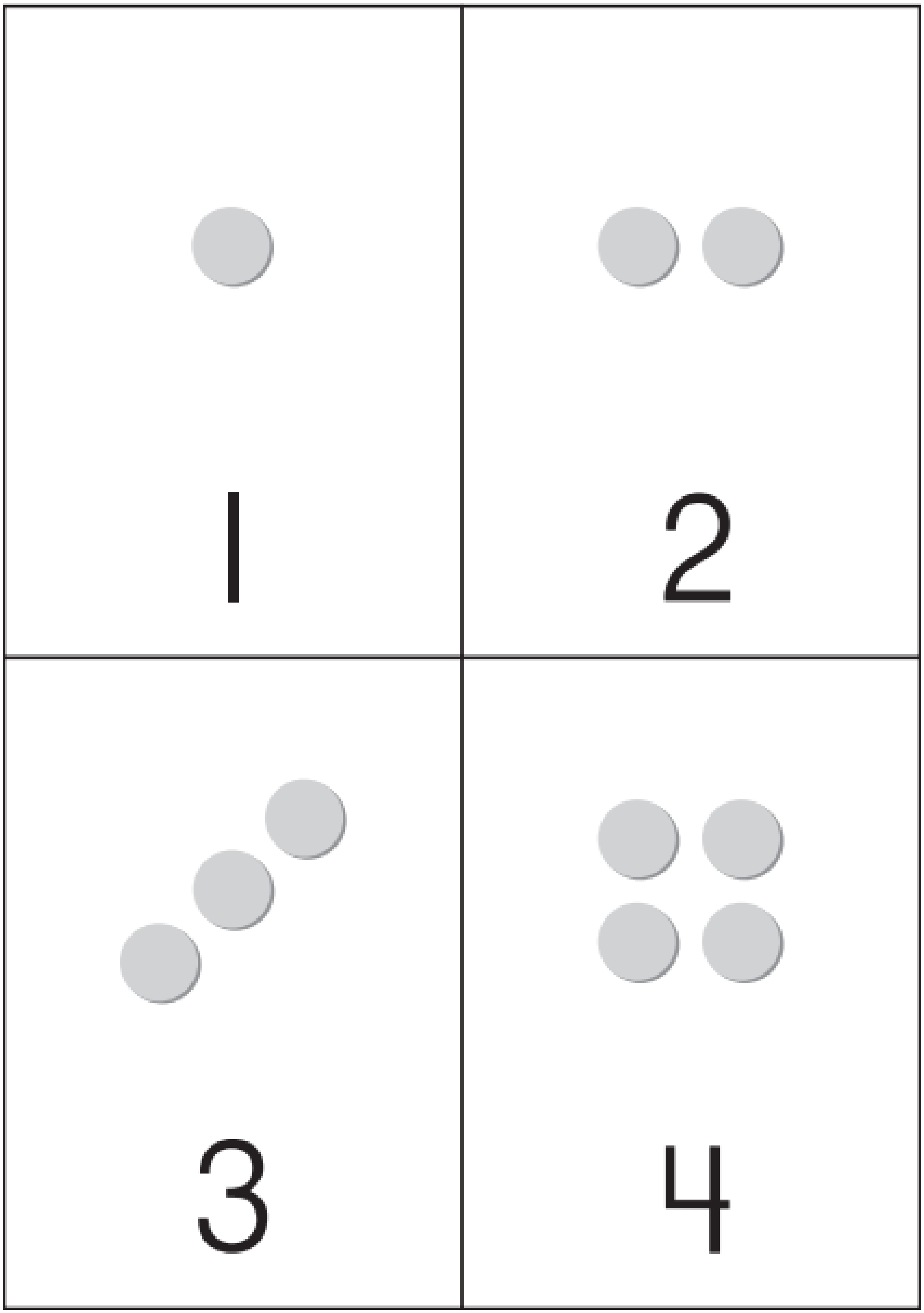


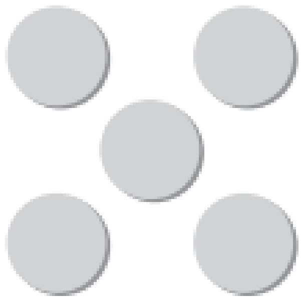
Workmat 4



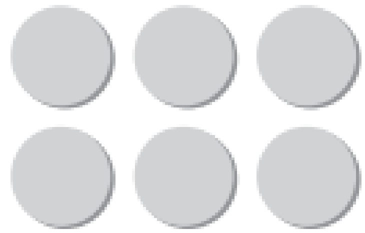




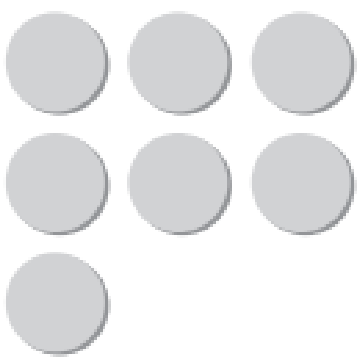

1
2
3
4



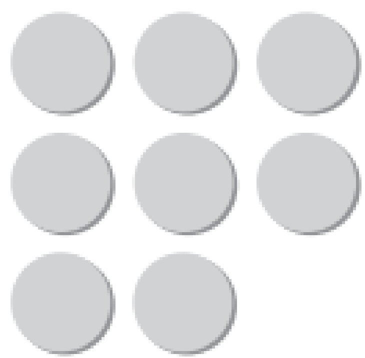
5



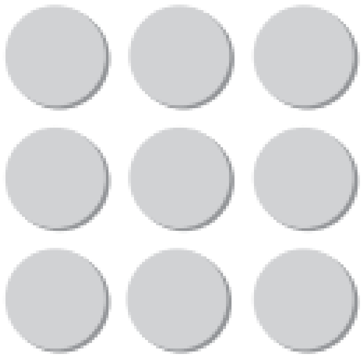
6



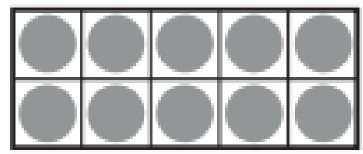
7



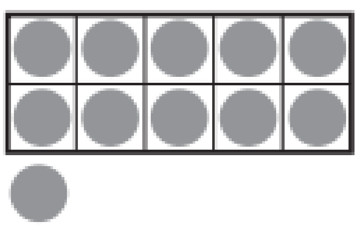
8



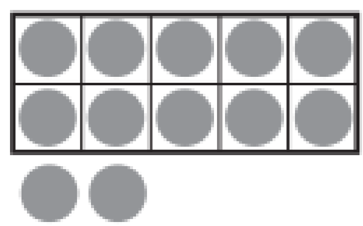
9



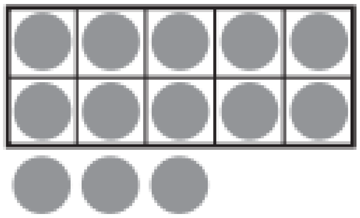
10



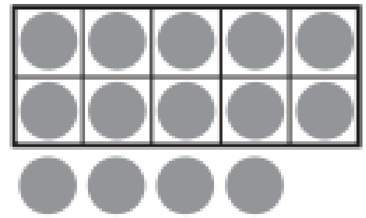
11



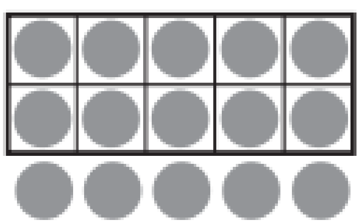
12



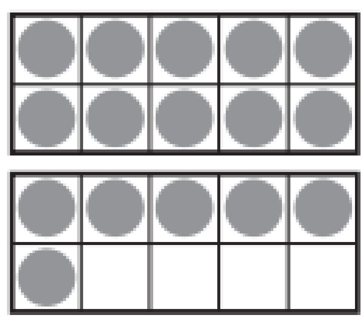
13



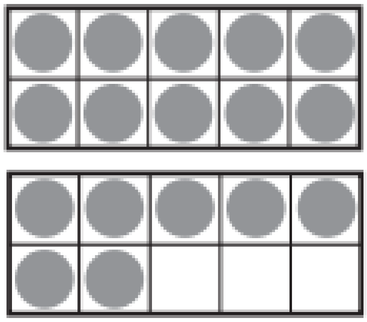
14



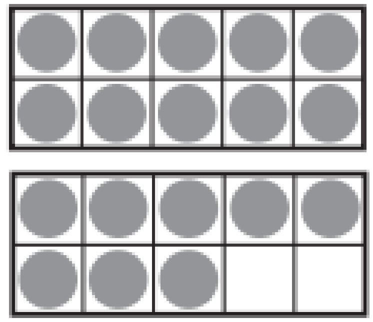
15



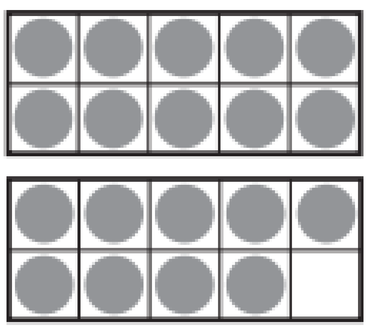
16



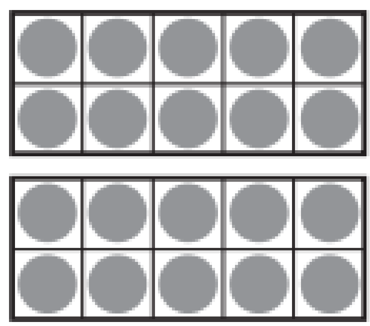
17



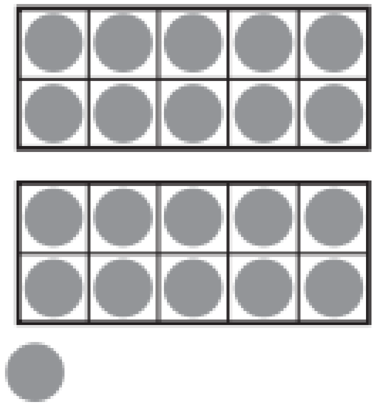
18



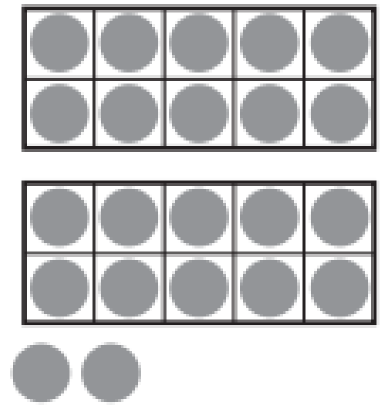
19



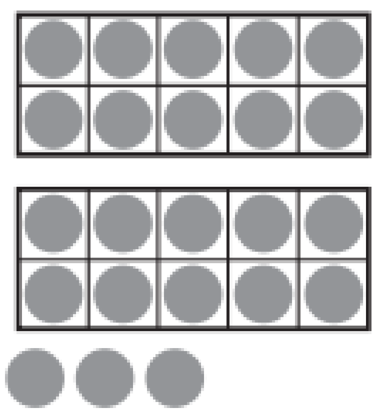
20



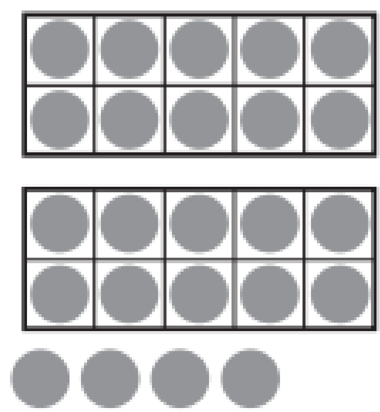
21



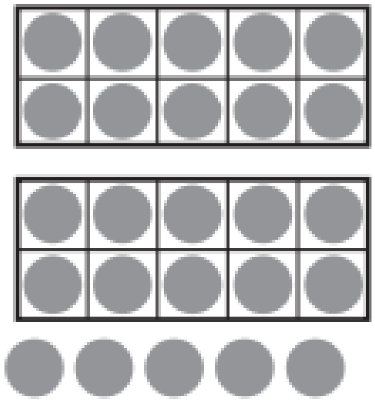
22



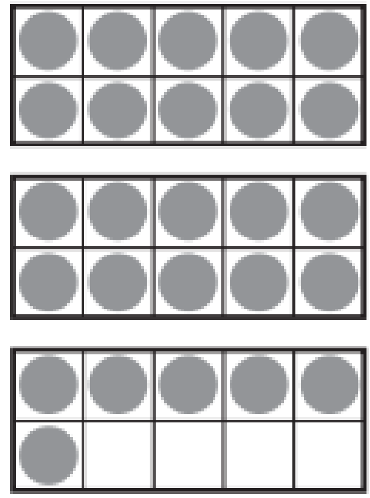
23



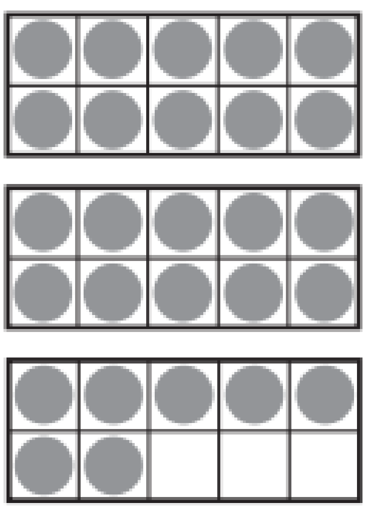
24



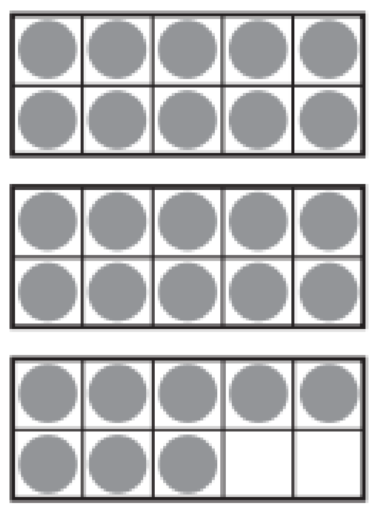
25



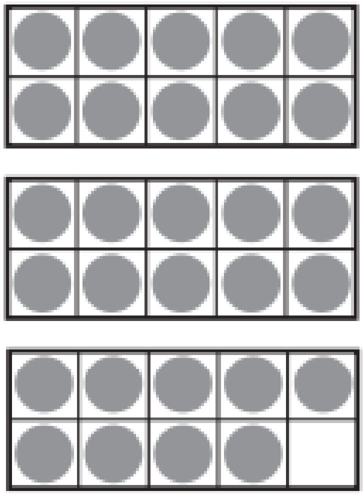
26



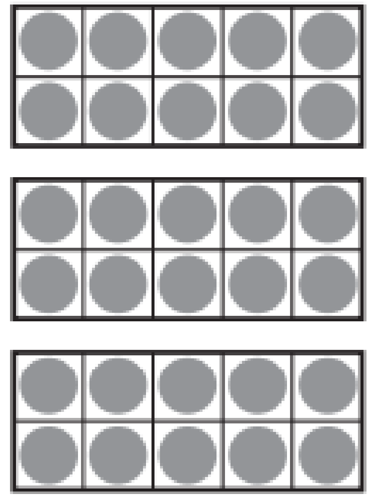
27



28



29



30