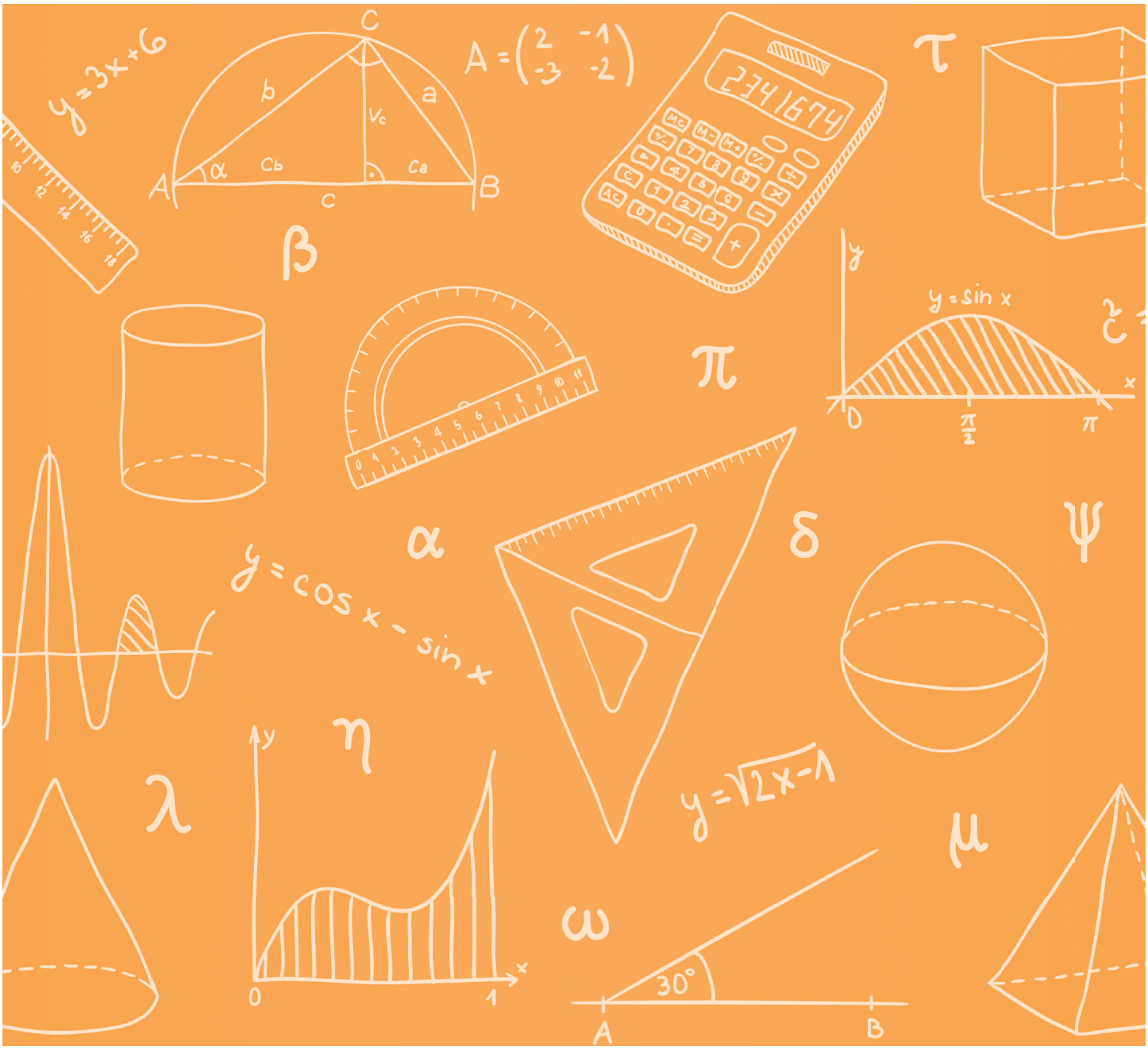
GRADE
K

LESSONS FOR LEARNING

FOR THE COMMON CORE STATE STANDARDS IN MATHEMATICS



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K-12 MATHEMATICS
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Kindergarten – Standards

1. **Representing, relating and operating on whole numbers, initially with sets of objects** – Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.
2. **Describing shapes and space** – Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

MATHEMATICAL PRACTICES

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

COUNTING AND CARDINALITY

Know number names and the count sequence.

K.CC.1 Count to 100 by ones and by tens.

K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.3 Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.

b. 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.

c. Understand that each successive number name refers to a quantity that is one larger.

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

Compare numbers.

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. (Note: Include groups with up to ten objects.)

K.CC.7 Compare two numbers between 1 and 10 presented as written numerals.

OPERATIONS AND ALGEBRAIC THINKING

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (Note: Drawings need not show details, but should show the mathematics in the problem – this applies wherever drawings are mentioned in the Standards.)

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

K.OA.5 Fluently add and subtract within 5.

NUMBER AND OPERATIONS IN BASE TEN

Work with numbers 11 – 19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 +8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

MEASUREMENT AND DATA

Describe and compare measurable attributes.

K.MD.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

K.MD.2 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. *For example, directly compare the heights of two children and describe one child as taller/shorter.*

Classify objects and count the number of objects in each category.

K.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Note: Limit category counts to be less than or equal to 10.)

GEOMETRY

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind, and next to.*

K.G.2 Correctly name shapes regardless of their orientations or overall size.

K.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Analyze, compare, create, and compose shapes.

K.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/ "corners") and other attributes (e.g., having sides of equal length).

K.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

K.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

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Handfuls of Counting

Common Core Standard:

Know number names and count the sequence.

K.CC.1 Count to 100 by ones and by tens.

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.
b. 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.
c. Understand that each successive number name refers to a quantity that is one larger.

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

Standards for Mathematical Practice

6. Attends to precision.
7. Looks for and makes use of structure.
8. Look for and express regularity in repeated reasoning.

Student Outcomes:

- As I rote count, I can connect the oral number word with the collection.
- As I rote count, I understand the concept of each successive number includes all of the previous numbers (cardinality).
- As I rote count, I can connect the number word to the collection and to the symbol.

Materials:

- One or two tubs of manipulatives per table
- 1 set of large number cards (0-10) for whole group modeling
- A piece of construction paper or shelf liner to be used as a "math mat" during exploration (per student)

Advance Preparation:

Material Preparation

- Gather materials as listed above

Thinking Preparation

- Review standards for mathematical practice and select those you will focus on during this lesson.
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas (Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects).
- Anticipate misconceptions as listed below.

Directions:

1. Gather students on the carpet.
2. Teacher will select a group of students (ten or under) to stand based on a predetermined attribute (ex: all students wearing shorts, pants, red socks, etc.)
3. Tell students we are working on answering the question "How many?" Ask students "How can we find the answer?" Have a class discussion that generates the strategy of counting by ones.
4. Cluster selected students on one side of the carpet. Teacher models how to count the group.
    a. As I count I will say one number for every child I count
    b. While rote counting, teacher will move students to create a new group of "counted students". As students are added to the new group it is important to model the concept of cardinality.
        - Select 1 student--Say "1"
        - Move that student to a new group.
        - Return to original group—select next student
        - "Say 2"
        - Move that student to the new group and **recount** by saying 1,2.
        - Return to original group—select next student
        - "Say 3"
        - Move student to new group and recount "1, 2, 3".
        - Repeat until all students are moved/counted.
5. Gather a new group of students based on a different predetermined attribute and have a student leader model the counting process (teacher assists as needed). Repeat 2 to 3 additional times as needed.
    * Teacher note: If students seem confident with the task, number cards can be added to the counting process. As each student is counted, they hold the numeral that corresponds. This will connect the collection, number word, and symbol for the students.
6. Tell students that they will now work at their tables to answer the same question, "How many?"
7. Students can return to work spaces, and take one-handed handfuls out of boxes of manipulatives and count using the strategy modeled during the lesson. As they count, students should move their manipulatives from one side of the mat to the other, creating a new "counted" group.
    * Teacher note: This process also enables students to keep track of which objects are counted and are yet to be counted (K.CC.4a,b).
8. After counting, sliding, and recounting all manipulatives in the "counted group", students should return the handful to the tub, take another handful, and repeat process.
9. After five to seven minutes have students return to the carpet. Use after questions to discuss process used to count the handfuls.

Questions to Pose:

<u>Before:</u>

- How can we find out how many?
- What does it mean to count?
- How do I count?

<u>During:</u>

- What are some answers that would not make sense when answering "how many"?
- What methods can be used to solve the problem/answer the question?

- What are possible strategies that you could use (one to one correspondence, creating a new group of "counted objects", etc.)
- How did you get your answer?

After:

- How can you explain your strategy and answer to someone else?
- What did you learn that you did not know before?

Possible Misconceptions/Suggestions:

Misconceptions	Suggestions
Student has difficulty with rote counting	Teacher can decrease the total number of items counted.
A student has difficulty with one to one correspondence	Teacher should frequently model beginning with one cluster and as each manipulative is counted, it is moved to a new counted cluster.

Special Notes:

- This lesson can be repeated throughout the year as students are ready for larger quantities and acquire more strategies.
- To build an understanding of five, students can create groups of 5 on a five frame and count how many groups of five ones.
- To count by tens, students can create groups of ten ones on a ten frame and count how many groups of ten ones.
- Students can also be encouraged to practice this skill in housekeeping, blocks, etc. (As I set the table for 3 people, each person needs 1 plate (1, 2, 3..), etc.).
- Acquiring a sense of number establishes a general intuition about numbers and their relationships and is the foundation for learning mathematics with understanding. Children develop a sense of number through their experiences. According to Steffe, et al (1988) interpreting a number requires three pieces of information: a known collection; the word that represents the numerical value of the collection; and, the symbol used to record the number word. These three "bits" of information comprise six relationships. Children must know these relationships for each number they learn. When students see a number they must have a conceptual vision of a collection of objects that match the number and the number word that refers to that conceptual unit. This is the beginning of unitizing. Understanding these six relationships is neither a simple nor an insignificant contribution to the mathematical success of students. The foundation for this complex and essential understand begins in the early years of a child's mathematical development. The Common Core State Standards assign to kindergarten the responsibility for teacher counting and cardinality, the beginning of number sense. Therefore, teachers at this level must help students create "mind pictures" of the quantity of a number, its number word, and the corresponding collection.

From: Midgett, Carol. *Counting and cardinality beginning with subitizing.*

Steffe, L.P., Von Glasersfeld, E. Richard, E. & Cobb, P. (1988). *Construction of arithmetical meaning and strategies.* New York: Springer-Verlag.

Solutions:

- Initially, all solutions should be focused on quantities ten or less.

Subitizing

Common Core Standard:

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.
b. 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.
c. Understand that each successive number name refers to a quantity that is one larger.

Additional/Supporting Standard(s):

Count to tell the number of objects.

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Student Outcomes:

- I can understand the relationship between number and quantities.
- I can explain relationships between numbers and sets of objects.
- I can identify how many manipulatives are in a given arrangement (without using one-to-one; with a focus on 1-5).

Materials:

- Blackline master subitizing cards (1 set for teacher and 1 set per pair)
- Set of 5 counters per pair
- 1 paper plate per pair

Advance Preparation:

Materials Preparation:

- Pre-copy and pre-cut subitizing cards for each pair/teacher
- Gather and bag sets of 5 counters per pair
- Gather 1 plate per pair

Thinking Preparation:

- Students will need to have had prior experiences with K.CC.5 in order to answer how many.
- Review standards for mathematical practice and select those that you will focus on during this lesson.
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas (Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects).
- Teachers should keep in mind subitizing cards should initially be introduced starting at the lowest number and moving up.
- Anticipate misconceptions as listed below.

Directions:

1. Gather students on the carpet.
2. Teacher will begin by displaying one subitizing card on the board, SMART board or by holding up the card.
3. Leave the card on the board and encourage students to share how they know how many are there (I counted by ones, etc.).
4. Introduce student to the idea that they are going to try to remember/create a mental image of the dots on the card to determine the quantity.
5. Begin by flashing students with the "one card" for 5 seconds. Tell students that when they have an answer they should hold up a quiet thumb (or other quiet signal) to indicate that they are ready to share. Teacher will call on 3 to 4 students to share their thinking and any strategies that they used (I counted by ones, I have seen it on a dice, I saw 2 and 1 more and I know that that is 3).
6. Repeat process for subitizing cards 2-5, staying in numerical order. Repeat process using cards 1-5 to increase fluency.
7. Pair students and give each pair a set of subitizing cards.
    - Designate a partner 1 and a partner 2.
    - Have partner 1 "5-second flash" the subitizing cards to partner 2.
    - Partner 2 then identifies the quantity.
    - Partner 1 and Partner 2 then count to confirm how many were on the card.
    - Continue with all the cards.
    - Partners switch roles and continue.
8. After 3 to 5 minutes have students clean up and return to the carpet.
9. Tell students that they are going to practice building the subitizing cards. Give each pair the bagged counters, paper plates, and subitizing cards.
    * Teacher note: model if needed, however students can also use this time to develop their own internalizations of how to build the number).
10. Students return to their work spaces. Place materials on the table and turn the subitizing cards face down.
    - Partner 2 closes their eyes while Partner 1 selects a subitizing card, and builds the same arrangement using the counters.
    - Partner 1 then covers the arrangement with the plate and tells Partner 2 they are ready.
    - Partner 1 removes the plate; gives Partner 2 "5 seconds" to determine the quantity; and then Partner 1 recovers the set.
    - Partner 2 shares their thinking and both Partner 1 and Partner 2 recount to confirm their thinking.
    - Repeat for all numbers and then partners switch roles.

* Teacher note: while students are identifying subitizing cards, the teacher is monitoring and making notes of students' abilities and strategies.
    - Is the student able to identify the card before double checking with one to one?
    - Does the student need use one to one correspondence in order to correctly identify the quantity on the card?

  While observing identify students who can share when the class is brought back together. Decide on order for students to share based on strategies that were used by the student.

11. Students clean up and return to the carpet. Preselected students can share how they built the quantity represented on the subitizing card. Teacher will use questions below to facilitate as students discuss their representations.

Questions to Pose:

Before:

- How many do you see? How do you know?
- What can you do to figure out how many there are?

During:

- What can you tell me about the card?
- When you look at this card, what do you see? How do you see the number? (ex: 5 is 4 dots and 1 more, etc.)

After:

- What did you notice about the cards?
- Which cards could you identify more quickly?
- How did you know how many were on the card?

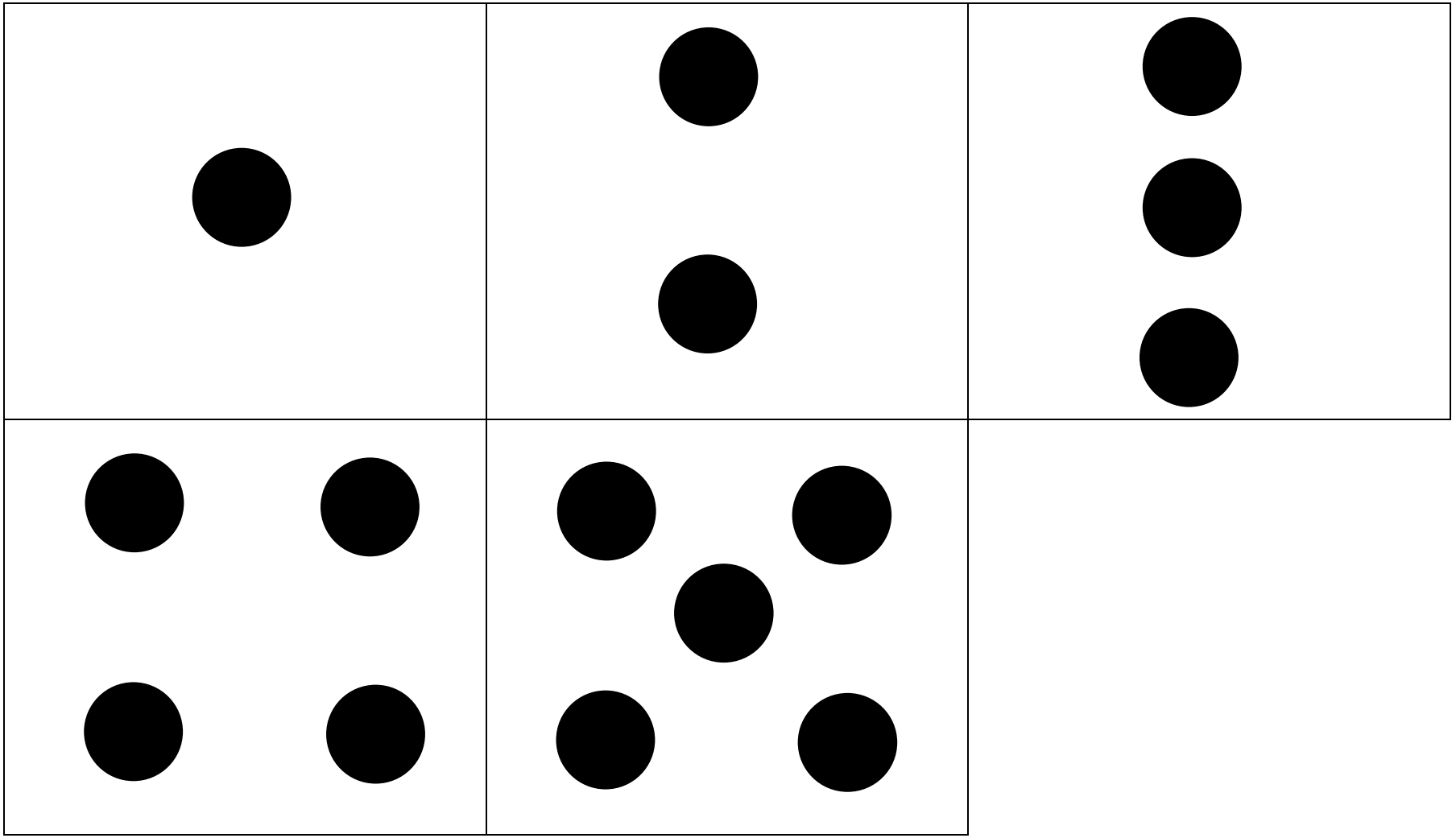
Possible Misconceptions/Suggestions:

Misconceptions	**Suggestions**
Students are unable to identify the amount of dots on the card.	Encourage students to count using one to one correspondence until they are more fluent.

Special Notes:

- Students will need multiple opportunities to practice using subitizing cards to increase their fluency.
- This lesson can be repeated with different arrangements of the original subitizing cards. However amounts should not exceed 5.
- Students should not use different arrangements until they have are fluent with the original structure.

Solutions: All answers should be 5 or less.



More or Less

Common Core Standards:

Compare numbers.

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.

Additional/Supporting Standard(s):

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

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

Standards for Mathematical Practice:

2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
6. Attend to precision
8. Look for and express regularity in repeated reasoning.

Student Outcomes:

- I can identify whether the number of objects in one group is greater than, less than or equal to the number of objects in another group.
- I can use one-to-one correspondence (or other counting strategies) to answer the question: How many are in one group?
- I can count to identify a quantity of objects arranged in a line, array, circle or scattered configuration.
- I understand the number of objects in a quantity does not change even when the objects are moved or rearranged.

Materials:

- Each student will need a bag with 2 dice and 24 manipulatives (counters, beans, buttons, bears, square tiles, etc.)
- Blackline Master Recording Sheet

Advance Preparation:

Materials Preparation:

- Each student will need a bag of 2 dice and 24 manipulatives.
- Each student will need a recording sheet.

Thinking Preparation:

- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/)
  Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects. (Unpacking Document p.5)
- Anticipate misconceptions listed below.

Directions:

1. Gather student leaders at the carpet.
2. Teacher will choose a student leader to model rolling two dice and counting the pips to identify the total number of pips rolled. (This can be done by using two dice, SMART board or a document camera.)
3. Student leader will then use manipulatives to create a representation of the quantity rolled on the board, SMART board or document camera.
4. Teacher will choose another student leader who will roll the two dice again. The student leader will count to identify how many pips were rolled and then build a representation of the quantity beside the first quantity.
   a. Note for teacher: You may want to have student leaders use manipulatives of two different colors so groups can easily be distinguished. (example: One student can use red and the other can use blue.)
5. As a group students will answer: Which group has more? Which group has less? How do you know? (Equal may need to be reviewed due to the chance students could roll the same number twice.)
6. Teacher can continue to have student leaders model rolling dice, identifying how many pips were rolled, building the two groups and identifying which group has more and less as needed.
7. Teacher will then pass out the bag of dice and manipulatives to each student.
8. Students will work for five to seven minutes to practice rolling the dice, identifying how many pips were rolled, building a group and then repeating to make a second group. Students will then be able to identify which group has more and which group has less.
   a. Teacher note: While students are creating quantities, the teacher is circulating and making note of students' abilities and strategies.
   b. While observing, identify students who can share when the class is brought back together. Decide the order for students to share with the group based on use of strategies.
   c. Depending on student's ability level, students can use recording sheet to record answers or students can work only with manipulatives and the teacher can record student's ability.
9. Students clean up materials and are brought back together. Pre-select students will share examples they completed during their working time. Teacher will use questions below to facilitate as students discuss which group has more and which group has less.

Questions to Pose:

Before:

- How can you determine how many you need in your group?
- Which of the two groups has more?
- Which of the two groups has less?
- How do you know?

During:

- Which group has more? How do you know?
- Which group has less? How do you know?
- What strategies can you use to determine which group has more or less? (Students can line up two groups to utilize matching strategies as seen in the Unpacking Documents on page 8.)

After:

- Which group has more? How do you know?
- Which group has less? How do you know?
- What strategies can you use to determine which group has more or less? (Students can line up two groups to utilize matching strategies as seen in the Unpacking Documents on page 8.)

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
Students have difficulty accurately identifying how many pips (or dots) are on the dice.	Use a teacher created dice in which the pips are larger for students to touch each one as counted. Students could use subitizing cards instead of dice.
Students have difficulty identifying which group is more and which is less.	Teacher can introduce student to matching strategy as noted in the Unpacking Documents on page 8.

Special Notes:

- Depending on student's ability level, students can use recording sheet to record answers or students can work only with manipulatives and the teacher can record student's ability.

Solutions:

- Students will identify how many pips (dots) were rolled on the dice.
- Of the two groups, students will identify which group has more and which group has less.

Rolling More

Common Core Standard:

Compare numbers.

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.

Additional /Supporting Standards:

Know number names and the count sequence.

K.CC.1 Count to 100 by ones and by tens.

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.
b. 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.
c. Understand that each successive number name refers to a quantity that is one larger.

Standards for Mathematical Practice:

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

Student Outcomes:

- I can identify the number of objects in a group as greater than, less than, or equal to the number of objects in another group, for numbers 1-5.
- I can understand the relationship between number labels (such as "4" naming a collection of four) and quantities. (K.CC.4)
- I understand that counting by ones increases the quantity by one more. (K.CC.1)

Materials:

- Objects to be counted (such as red/yellow counters or snap cubes), about 20 per student
- Five frame, 1 per student
- Dice, 1 die per pair of students

Advance Preparation:

- Review the Standards for Mathematical Practice and select those that you will focus on during this lesson.
- Review the Critical Areas for Kindergarten to connect this lesson with key mathematical ideas.
- Create a list of students who will be paired to work together during this lesson.
- Reproduce copies of five frames, 1 for each student
- Place counting objects and die for each pair of students in small self-closing bags

Directions:

1. Model how to play the game with students.
2. Organize students in pairs.
3. Distribute five frames, counters, and dice.
4. Student 1 rolls a die, says how many pips are on the die (without counting), then places that number of counters on his/her five frame.
5. Student 2 rolls, says number, and places same number of counters on his/her five frame.
6. Students compare their five frames and repeat the numbers they are showing.
7. Student 1 says, "I have ____. My number is (greater than, more than, fewer than, less than, or equal to) yours."
8. Student 2 says, "I have ____. My number is (greater than, more than, fewer than, less than, or equal to) yours.
9. The student with the greater number takes all the counters.
10. Students repeat game until no more counters are available.
11. Player with the most counters wins.

Questions to Pose:

As students play the game:

- How did you decide how many counters to place on your five frame?
- Tell me how you know your number is (greater, fewer, equal) to that of your partner?
- If you wanted to make your number equal to that of your partner, what would you need to do? How do you know? Show me.
- Explain to me how you might decide if your number is more or less without counting?
- How many more would you need to make 5? To make 10? Prove that to me.

Possible Misconceptions/Suggestions:

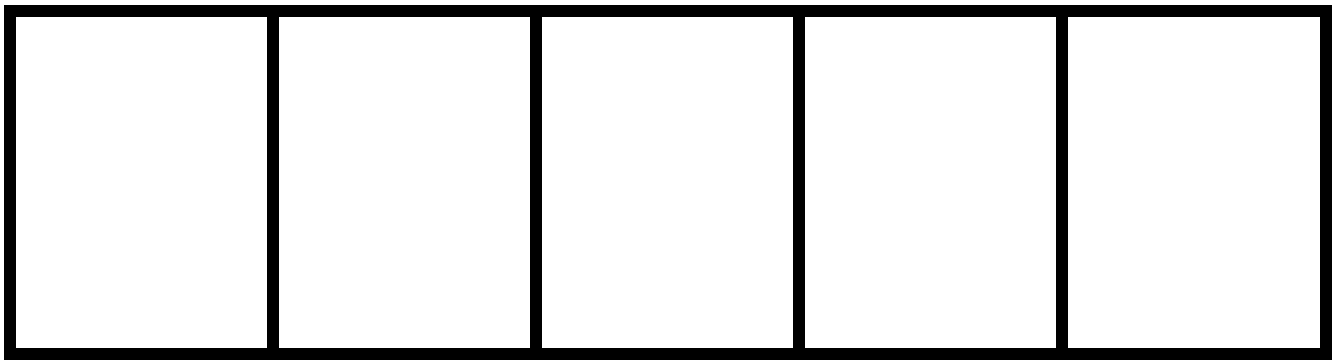
Possible Misconceptions	Suggestions
Student cannot tell instantly the number of pips on a die.	Give the student additional practice with quick images activities by showing dot cards with the pattern of pips without counting them. This helps student learn to subitize numbers which is the beginning of unitizing.
Student cannot tell which is greater or less.	Have the student compare the counters using one to one correspondence.
Student rolls a 6 on the die.	Student loses his turn or can roll again.

Special Notes:

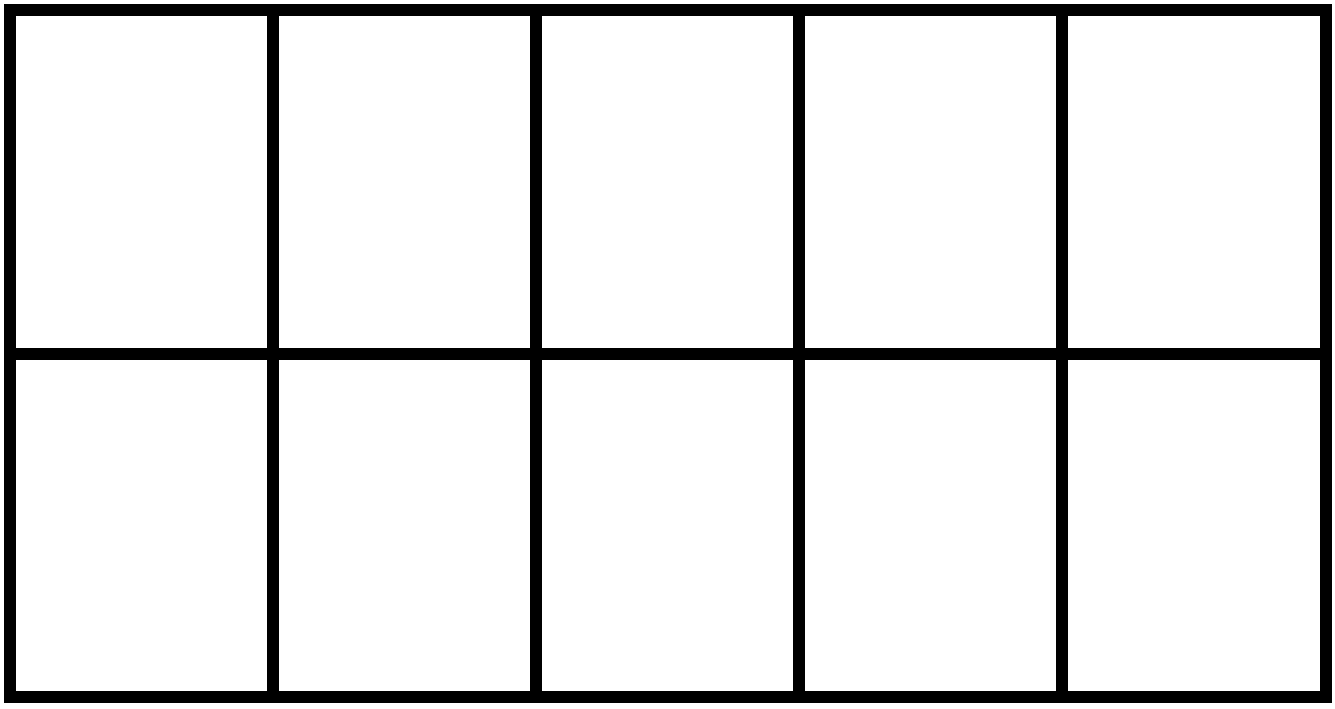
This activity provides an opportunity for teachers to assess students' abilities to subitize (instantly recognize) the number shown on the die when rolled. Teachers can also assess student understanding of the concept of cardinality (knowing that the last number counted , defines the quantity of the collection and understands that all the numbers coming before the last number are included in the collection), if student, when asked, "How many?" can tell the final count without recounting or renaming each counter.

Solutions: N/A

Five Frame



Ten Frame



Number Battle

Common Core Standard:

Compare numbers.

K.CC.7 Compare two numbers between 1 and 10 presented as written numerals.

Additional/Supporting Standard(s):

Know number names and the count sequence.

K.CC.3 Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

Count to tell the number of objects.

K.CC.4c Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.
b. 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.
c. Understand that each successive number name refers to a quantity that is one larger

Compare Numbers.

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.

Teacher Note: In order to be successful with K.CC.7, students need ample experiences with actual sets of objects before completing this standard with **only** numerals.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

Student Outcomes:

- I can compare two numbers between one and ten when presented as written numerals.
- I can connect that a written numeral represents a quantity.

Materials:

- Each pair will need one set numeral cards (if planning to use multiple times, print on cardstock and laminate)
- Number lines, manipulatives and white boards/markers should be in a location students can easily access if needed.

Advance Preparation:

Materials Preparation:

- Each pair will need one set of number cards
- Number lines, manipulatives, white boards and markers should be in a location student can easily access if needed for support.

Thinking Preparation:

- Make a list of pairs of students who are similar in ability levels.
- When circulating, plan to first visit/identify students who need most support based on observations in previous lessons.
- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/) Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects.
- Anticipate misconceptions listed below.

Directions:

1. Gather student at the carpet.
2. Teacher will begin by showing students two numerals on the board (3,8).
3. Student leaders will be asked to identify which numeral represents more. Teacher will facilitate as students answer: How do you know? What can you use to prove your thinking?
4. Students will use manipulatives, number line or drawings to confirm verbal statements.
5. Teacher will instruct students that today they are going to try and tell which numeral is more using only number cards.
6. Teacher will then present the class with two new numerals and choose a student leader to identify which numeral is more. (If student is unable to identify which numeral is more support as needed with a number line, manipulatives or drawings).
7. Teacher will then choose two student leaders to model playing "Number Battle."
    a. Cards are placed face down in the middle of the two students.
    b. Each student picks two cards from the top of the deck.
    c. Each student looks at his or her cards and decides which of their two numeral cards represents more.
    d. Each student will lay down their card they have identified as having more and say "My __ is more than __."
    e. The students will then compare the two cards chosen to the other saying " ___ is more than __."
    f. The student who laid down the larger numeral will take both cards.
    g. Students then draw one card each and continue game until all cards are used.
        - Teacher note: While students are comparing numeral cards, the teacher is circulating and making note of students' abilities and strategies (Is the student able to identify which numeral is more without using representations? Does the student need to use manipulatives each time? Are they accurately answering?).
        - While observing, identify pairs who can share when the class is brought back together. Decide the order for pairs to share with the group based on use of strategies.
        - Students can use manipulatives, drawings or number lines to confirm their thinking or as additional support. As you are circulating, encourage students to use as needed.
8. Students clean up materials and are brought back together. Pre-select pairs can share how they determined which numeral was more and what manipulatives were used to confirm their thinking. Teacher will use questions below to facilitate as students discuss how the drawings and strategies are alike and different.

Questions to Pose:

Before:

- Which numeral is more?
- How do you know?
- How can you prove or show your thinking?
- What does it mean to compare two numerals?

During:

- Tell me about your thinking.
- How did you compare the two numbers?
- How do you know __ is more than __?
- What can you do to prove your statement to someone who disagrees?
- Compare your thinking about the problem to your partner's; how are they alike/different?

After:

- Think of two numbers you compared. How did you find out which one was more?
- What did you do if your partner disagreed with you?
- What other ways could you prove your thinking?
- How could you use this process with bigger numbers?
- Compare your thinking about the problem to your partner's; how are they alike/different?
- What did you learn that you did not know before?

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Students are unable to accurately identify which written numeral is larger.	Encourage students to use manipulatives, drawings or numbers lines to compare numbers.
Students have difficulty identifying which group is more with a visual representation.	Teacher can introduce student to matching strategy as noted in the Unpacking Documents on page 8.

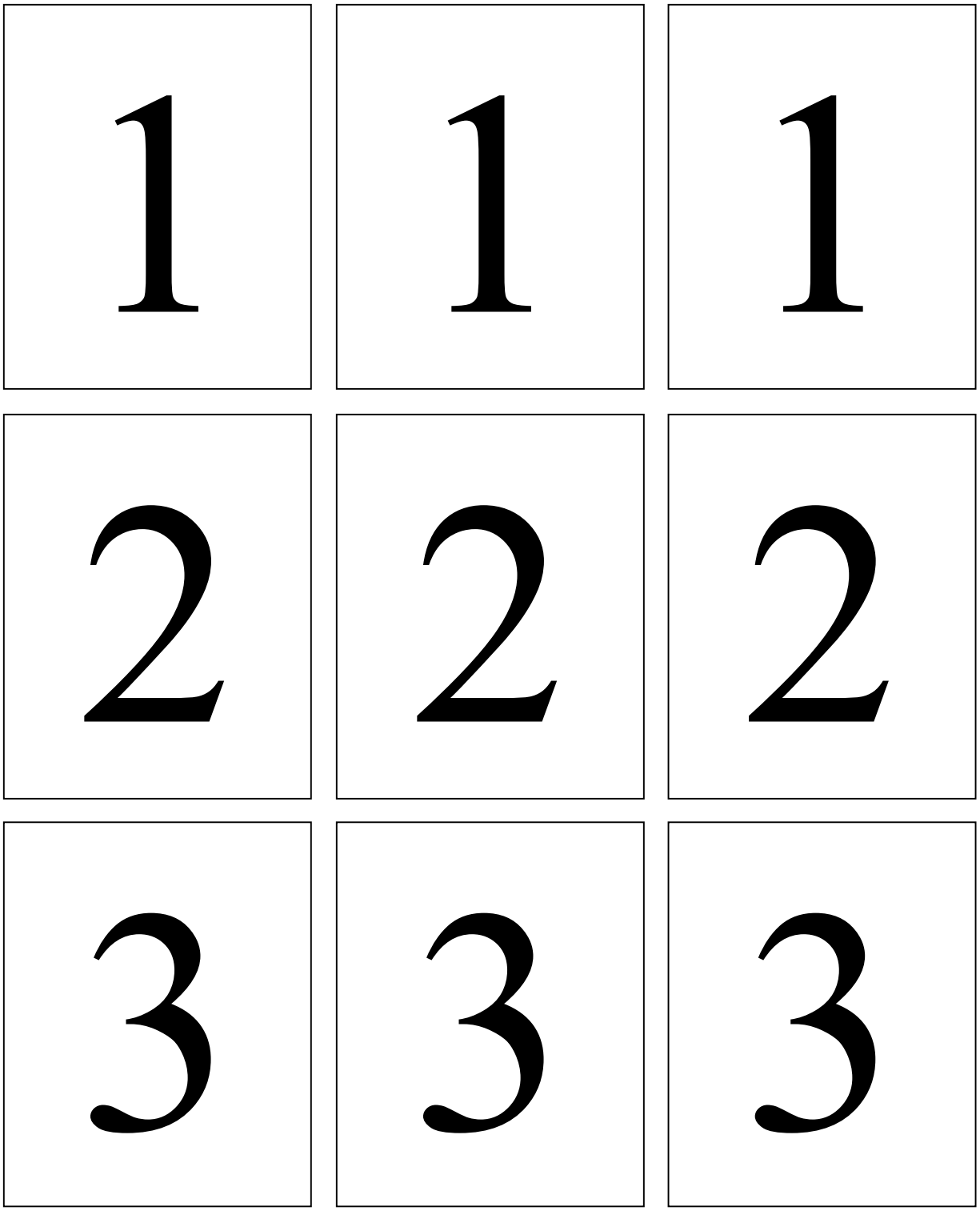
Special Notes:

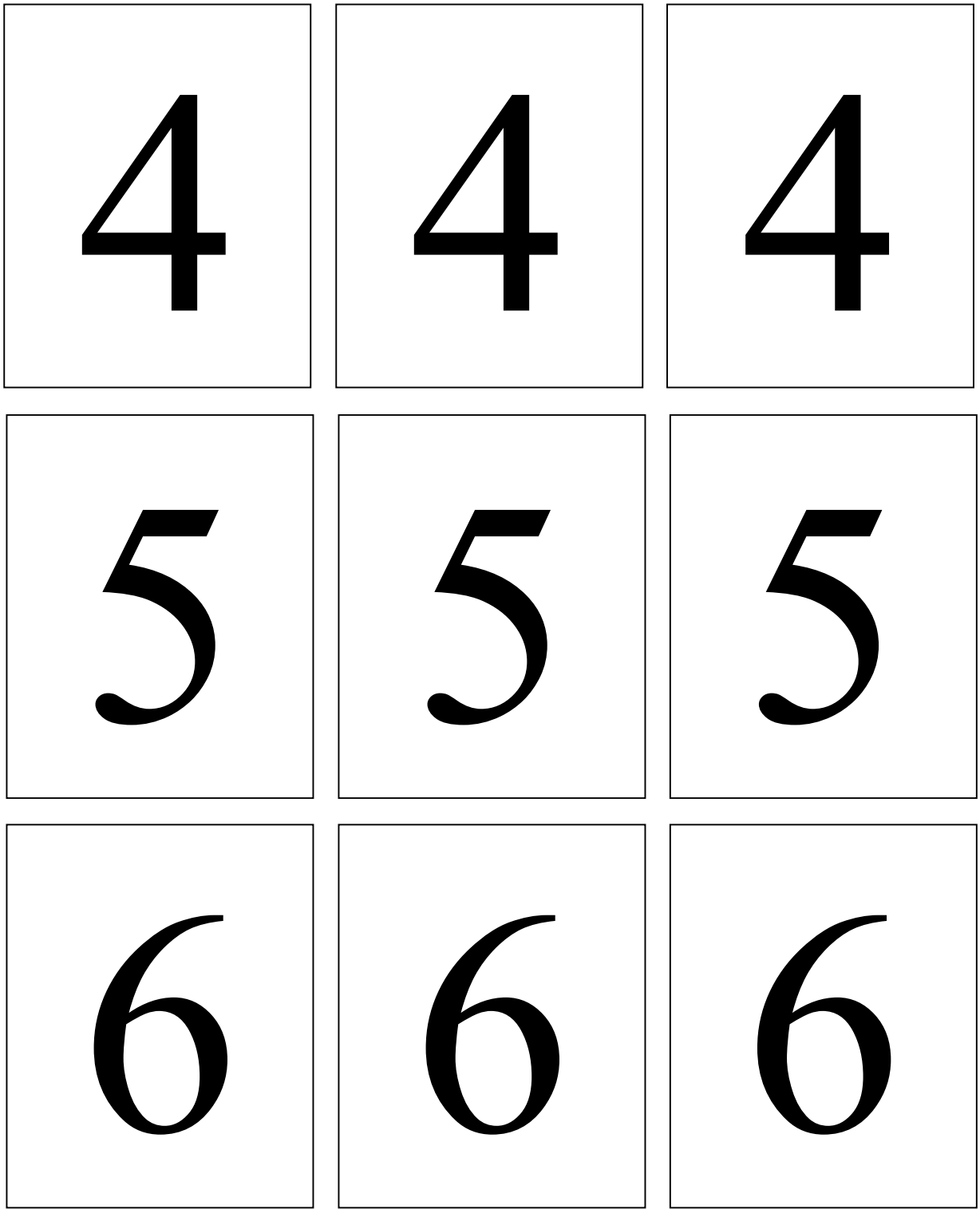
- In order to be successful with K.CC.7, students need ample experiences with actual sets of objects before completing this standard with **only** numerals.
- Students will need multiple experiences with sets of objects and should begin to transition to identifying which numeral is larger without having to create a set, however continue to provide support to students who still need visual support.
- This activity can be repeated as needed to increase mastery and fluency.
- This activity can be sent home as a homework piece for parents to play with students.
- Students can also play this game with each partner picking one card and comparing those two numerals to identify which numeral is more.

Solutions:

- Students will identify which written numeral is larger.
- Students may need manipulatives, drawings or a number line to assist in identifying which numeral is more.

Blackline Master: Number Cards (1 set is 3 of each number)




4 4 4
5 5 5
6 6 6

7	7	7
8	8	8
9	9	9

10	10	10
0	0	0

Ant Math Stories

Common Core Standards:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings[1], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

Additional Standards:

Count to tell the number of objects.

K.CC.4a Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.
b. 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.
c. Understand that each successive number name refers to a quantity that is one larger.

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.5 Fluently add and subtract within 5.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
6. Attend to precision.

Student Outcomes:

- I can describe the process of addition by telling a math story.
- I can represent my story with objects and/or actions.
- I can explain how groups of objects work together to create larger sets.
- I can use one-to-one correspondence to find the sum of my story situations.

Materials:

Whole Group Materials

- Ant Hats (make with pipe cleaners and sentence strips)
- Cloth for the picnic

Partner Work Materials

- Attached math mats (one mat per set of partners)
- Pictures of ants (attached) or manipulative (like unifix cubes)

Advance Material Preparation:

- Gather/make five ant hats
- Gather a picnic cloth (alternative: large piece of paper or a space taped off on the floor)
- Copy ants for small group/partner work (1 set per pair or small group)
- Copy picnic mats (at least one per pair)

Advance Thinking Preparation:

- Review the standards for mathematical practice and select those that you will focus on during the lesson.
- Review Critical Area One for kindergarten (Representing, relating, and operating on whole numbers, initially with sets of objects) to connect this lesson with key mathematical ideas.
- Review misconceptions below to plan how to respond and come up with possible story situations to clarify these misconceptions (ex: http://maccss.ncdpi.wikispaces.net/file/view/unpacked+K+January+2012.pdf Appendix pg. 18).
- Create list of possible student pairs for the practice portion of the task.

Previous Lessons:

- Counting sets of objects with one-to-one correspondence
- Discussed how two groups can be joined together to find a new sum

Directions:

1. Gather students on the carpet.
2. Teacher will model how to tell a math story and the language to be used during the math story.
3. Use the ant hats and the cloth. Choose 5 students to be ants. Have them stand to the side until you begin to tell the story. Ex: "I was at a picnic when ants started coming to the picnic! One ant came (have a student wearing an ant hat "walk" to the picnic and stand on the picnic cloth) and then one more ant came to join him. Now there are 2 ants at our picnic! Repeat with a different set of students if needed (teacher narrates) keeping the sum five and under. (Make sure the students that are counted as part of the story are **on** the picnic cloth so it is clear who is included in the addition story).
4. While still in whole group, have a few students narrate a story while fellow students act it out.
5. Afterwards, review the process used to narrate a math story.
6. Give each individual/pair picnic mats and ant pictures (or another manipulative). Students will practice telling math stories with a small group or partner. Remind students to use similar language as modeled in whole group lessons. During practice, teacher interacts with students to facilitate math story.
    - Make sure students are able to explain which strategy they used to arrive at their total (First I had 2 ants, then I added 3 so now I have 5. I counted by ones, I counted on from…, etc.)
    - While observing students take note of who is using a strategy that should be reinforced with the whole class during the share (students who added one ant at a time, students who were able to count on, etc.)
7. Have students rejoin you on the carpet to share and model their ant stories. Use preselected students (based on observations) to share their thinking/math stories. *(This can be done with either the mats or the original picnic blanket and hats.)

Questions to Pose

Before

- How can I identify how many ants are at my picnic?

During

- Tell me about your story.
- How do you know _____ is how many you have?
- What would happen if _____ more came?
- What strategy did you use to count your ants (counting on, counting by ones, etc.)

After

- Describe how you can make a set of five.

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
Which ants are we counting?	• Make sure students are aware that you are only counting the group on the picnic cloth/mat • When adding students, have them walk onto the picnic cloth • When practicing independently, have student move "ants" onto their mats
Difficulty with one to one correspondence	• During whole group, model one-to-one correspondence while counting • During independent practice have students touch each manipulative as they count

Special Notes:

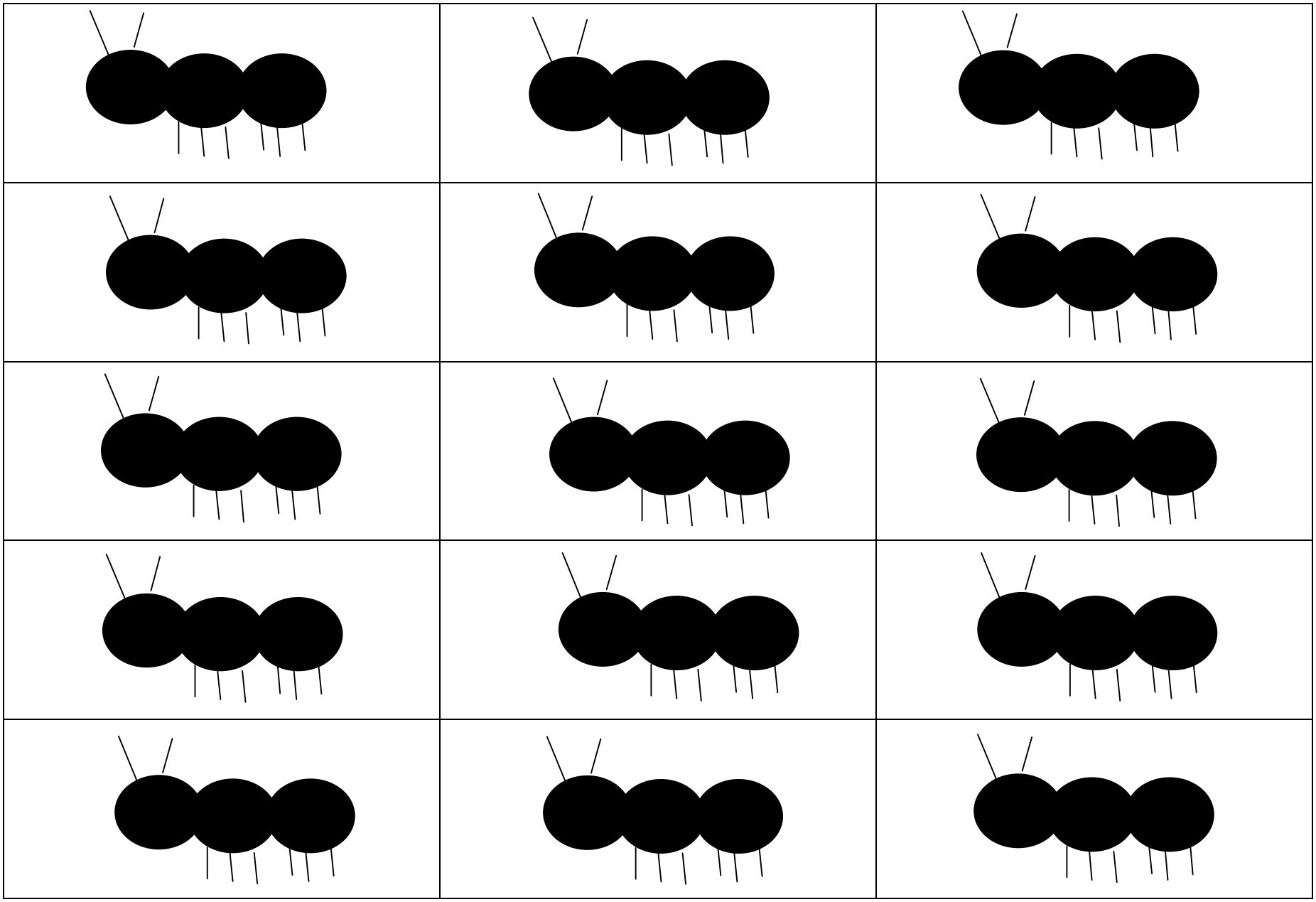
After practice in small groups or partners, this activity can be moved to a math station or center. This activity may require several exposures for students to consistently use "math story talk" independently.

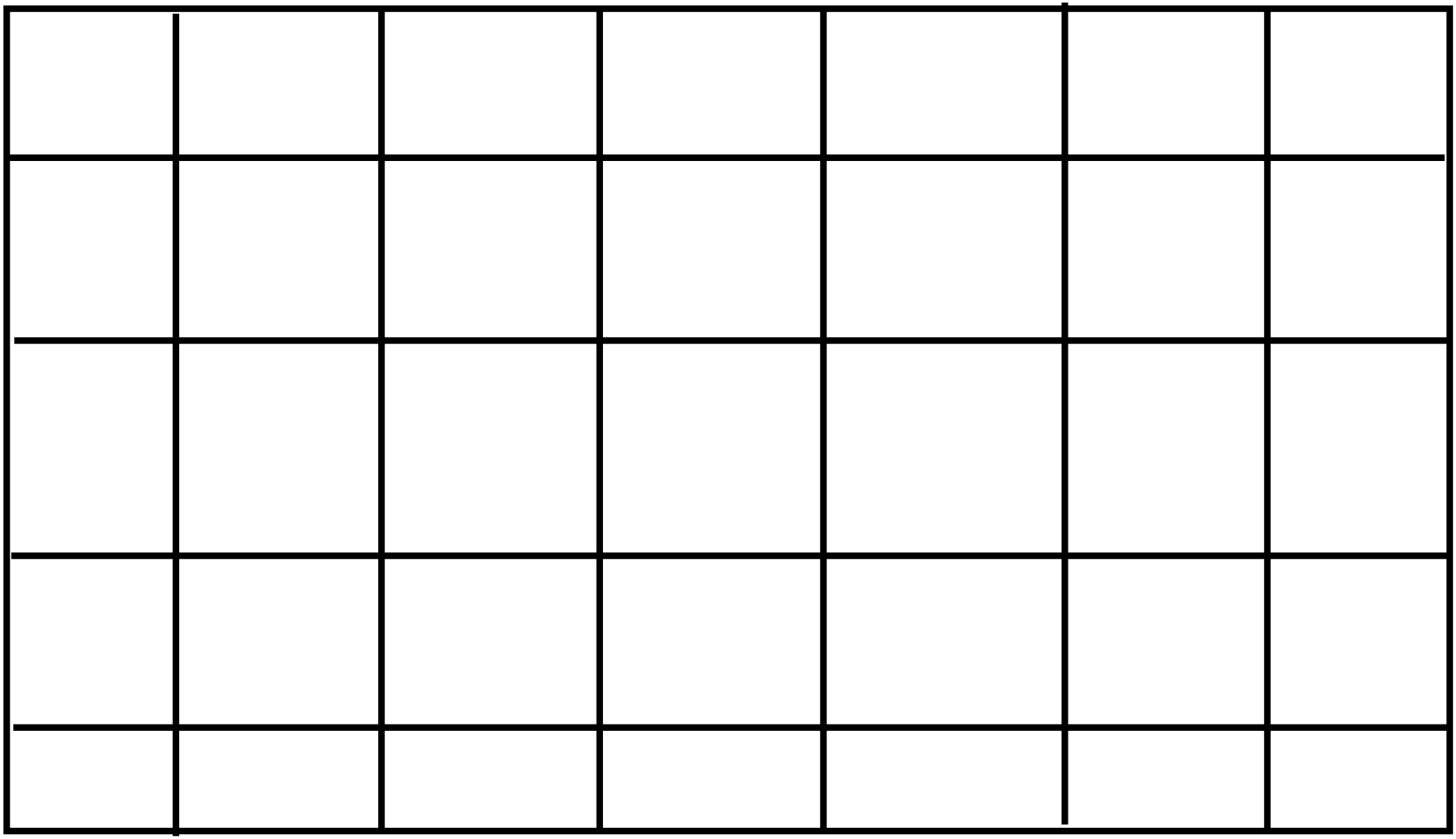
Solutions:

- Sums of Five
- Plus one pattern (1+1=2, 2+1=3, etc.)

Extensions:

- Repeat with subtraction
- Have students practice telling stories with different addends (4+1, 2+3, etc.)





Problem at the Picnic

Common Core Standards:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

Additional Standards:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

K.OA.5 Fluently add and subtract within 5.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

Student Outcomes:

- I can tell and solve story situations with numbers up to five.
- I understand that two smaller numbers can be put together to make a larger number.
- I can use one to one correspondence and number partners to put two numbers together.

Materials:

- Story situation mats
- Connecting cubes or other manipulative

Advance Preparation:

Materials Preparation:

- Teachers will need to print out story situation mats for each student and have five manipulatives for each student.

Thinking Preparation:

- Review the Standards for Mathematical Practice and select those that you will focus on during this lesson. http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the Critical Areas for Kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/)
- Teachers will need to have previously taught lessons in which students were acting out story situations.

- When introducing addition story situations, focus on Add To and Result Unknown. See Questions to Pose and Possible Misconceptions to assist in coming up with possible story situations. (http://maccss.ncdpi.wikispaces.net/file/view/unpacked+K+January+2012.pdf Appendix pg 18)

Directions:

1. Gather students at the carpet.
2. Teacher will begin by introducing students to the story situation mat (on board or Smartboard). The teacher will choose a student leader to model using the manipulatives to solve a given situation. As the teacher gives addition situation problems (with a focus on a sum of five and under), the student leader will use the manipulatives or board to solve the situation. Student leaders will continue to solve three or four additional situation examples to provide modeling for the class.
3. Students will then be given individual mats and five manipulatives to work independently telling story situations using their mats.
    - While observing, identify students who can share when the class is brought back together. Decide the order for students to share with the group based on use of strategies (for example: Students who began with a misconception and then problem solved to correct. Students who count by ones. Students who used partners.)
4. Students are brought back together.
5. Have students who you selected share story situations they created using their mats. Students can also share strategies they discovered to help them find the totals. (Having students discuss story situations and solutions provides students an opportunity to see multiple solution strategies, various reasoning abilities and encourages a mathematical community in which students are comfortable sharing solutions and posing questions.)

Questions to Pose:

Possible Situation Problems

- There were two ants at the picnic. One more came. How many ants are at the picnic now?
- There were four flies at the picnic. One more came. How many flies are at the picnic now?
- There were two caterpillars at the picnic. Two more came. How many caterpillars are at the picnic now?

Before

- What do we know about the problem?
- What strategies can we use to solve this problem?

During

- Tell me about your story.
- What strategy did you use when you were placing more (insect) on the mat so you did not get confused on how many more you needed to put down?
- How do you know (number) is how many you have?
- What would happen if (number) more came?

After

- What was our problem asking us to find?
- How did we solve our problem?
- What strategies did we use to solve our problem?

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
Students have difficulty with one to one correspondence.	During independent practice, focus on touching each manipulative and sliding it away from the group to create a new pile that has been counted.
Students count the starting number when adding the second number. (If there are two ants and three more came, how many are there? Student places two ants then only adds one to make the three.)	Introduce strategy of using a space between two groups to see how many of each insect there should be. A popsicle or craft stick may also be used to show a break in the two numbers.

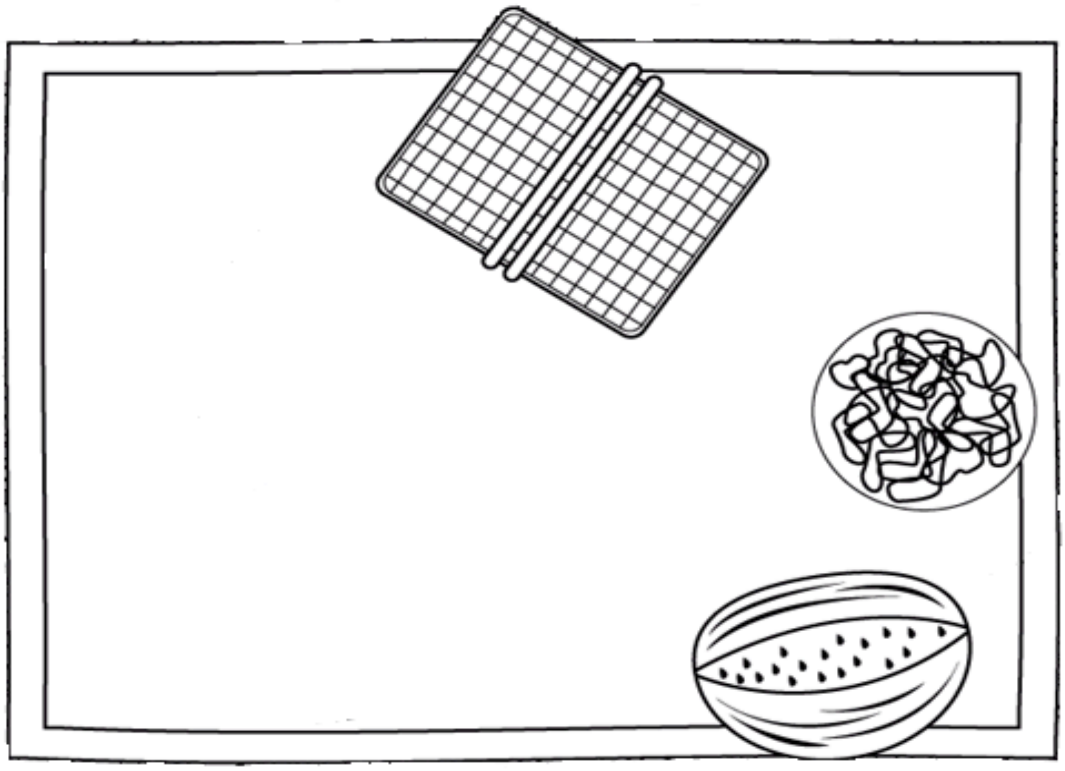
Special Notes:

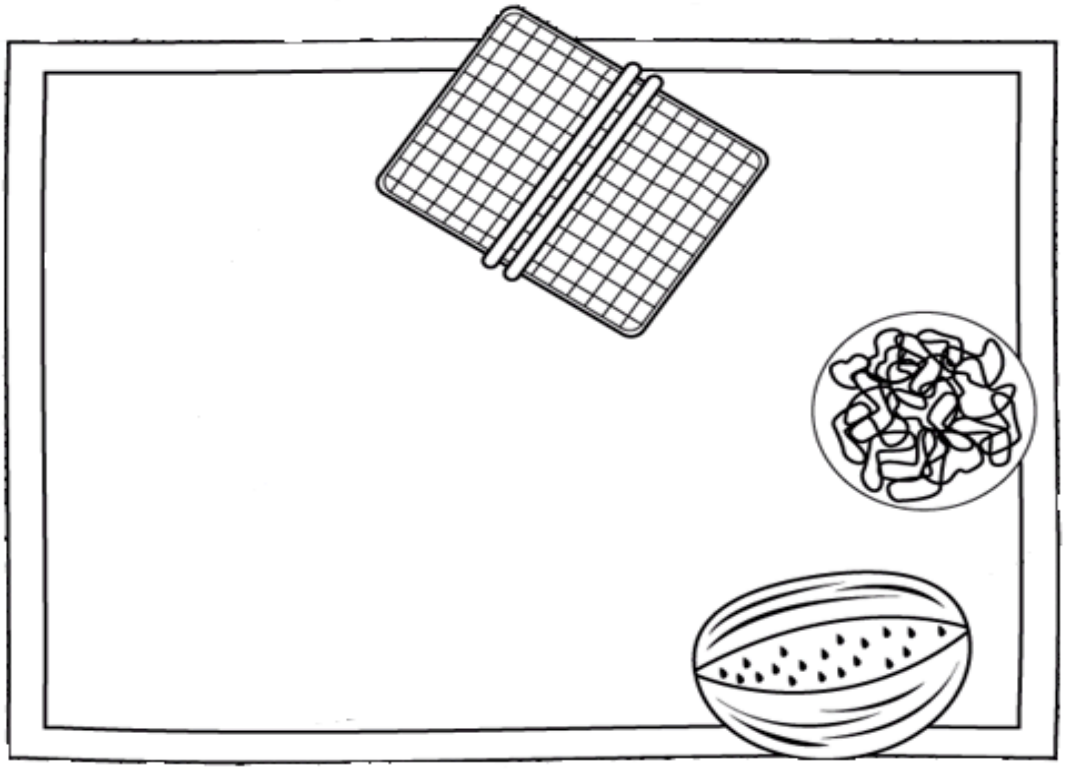
Extension: Students can record work in a math notebook to use as a work sample. These work samples can be later used as informal assessments and presented at parent conferences.

Solutions:

All answers should be a sum of five or under.

Blackline Master Picnic Story Situation Mat





Jungle Math

Common Core Standard:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Additional/Supporting Standard(s):

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings[1], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

K.OA.5 Fluently add and subtract within 5.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

Student Outcomes:

- I can use addition and subtraction to solve problems.
- I can use strategies to solve problems (such as counting on, counting back, making ten).
- I can explain my strategy and reason for using it with others.

Materials:

- Math notebooks or paper to record work
- Blackline Master: Story mats
- 10 manipulatives per student (counters, snap cubes, beans, bears, buttons) possibly placed into bags before lesson to maintain a focus on ten

Advance Preparation:

Materials Preparation:

- Have materials easily available for students to use.
- Prepare story mats for each student.

Thinking Preparation:

- Create list of problems students will use during whole group (utilizing chart Common Addition and Subtraction Situation)
- CCSS-M states, "Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required." It is not until first grade that the "understanding of the equal sign" is an expectation.
- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/) Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects.
- Anticipate misconceptions listed below.

Directions:

1. Gather students at the carpet.
2. Using SMART board, white board and manipulatives provide students with story situation.
   "Five monkeys were hanging in a tree. Three monkeys went to look for bananas. How many monkeys are in the tree now?"
3. Ask students to restate the problem in their own words. Students "unpack" the problem (give the information they know about the problem from reading it.)
4. Have students suggest "possible" answers and justifying their response.
5. Continue with a focus on Take from/Result Unknown type problems like:
   a. Four elephants were in the jungle. Three elephants went to take a bath. How many elephants are in the jungle?
   b. Six lions were sleeping in the sun. Two lions woke up and went for a run. How many lions are still asleep?
   c. Four toucans were in the palm tree. Four toucans flew away. How many toucans are left in the palm tree?
   d. Eight giraffes were eating leaves. Three giraffes went to play. How many giraffes are still eating leaves?

   Students will suggest "possible" answers and utilize manipulatives to model their thinking. Teacher is facilitating as students share their strategies for solving and reasoning.
6. Students are given a story situation mat and manipulatives to begin telling their own story situations.
   a. Some students may try to write equations to represent their drawings, see thinking preparation above for note about equation expectations.
   b. Teacher should circulate and monitor students use of Take from/Result Unknown type problems. Teachers should make note of students' abilities and strategies (Does the student need to count from one to find the total? Can the student start at the first addend and count on? Is the student familiar with number partners and can quickly identify the sum?)

c. Encourage students to record drawing representation in math notebook. While observing, identify students who can share specific story situations they created when the class is brought back together. Decide the order for students to share with the group based on use of strategies. Decide the sharing order for selected students beginning with a student who has a simple solution and progressing to students with more complex solution strategies. This allows students to visualize connections and relationships in solution strategies.

7. Students clean up materials and are brought back together. Pre-selected students can share the story situation they created and how they came to their answer. Teacher will use questions below to facilitate as students discuss how the drawings and strategies are alike and different. It is important for the teacher to allow students who have been selected to share to do most of the talking, with teacher offering support and clarification if needed.

Questions to Pose:

Before

- What can you tell me about this problem?
- What are you being asked to find?
- What are some ways you can show your mathematical thinking when you work on this problem?

During

- Tell me about your thinking.
- Retell the problem again for me. What are you wanting to find?
- What tool did you decide to use for this problem? Why did you select it?
- What would happen if …?
- How can you show that solution on paper for others to see?
- How can you represent this problem to make someone else understand it?

After

- Tell the group how you solved it? What did you do first? Why? What did you do next? Why?
- What was your mathematical thinking for this problem?
- How do the student leaders' problems compare to our original problem?
- In the problems we have focused on today, what have we been asked to find? (May need to show previous work samples)

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Students have difficulty with one to one correspondence.	During independent practice, focus on touching each manipulative and sliding it away from the group to create a new pile that has been counted.
When identifying the difference of the story situation, students do not recount but instead identify the number taken away as the answer. (Ex: 5-4, student says "4".)	When removing items from a group. Make sure students move the removed items apart from the group.
When telling story situations the students add the two quantities rather than taking away.	Remind students that with these problems we are taking the total apart not adding to.

Special Notes:

- This lesson can be repeated as need to encourage mastery and fluency with this type of problems.
- This lesson can also be repeated and students work with a partner. Partner one can tell the situation while partner two solves and then switch to continue practice solving problems. Other story situation mats can be used to allow students various story situations settings.
- Directions for this activity and mats can be sent home for students to practice as homework.
- The format of this lesson can be reproduced and substitute problem types to focus on Take Apart/Total Unknown and later Take Apart/Addend Unknown.

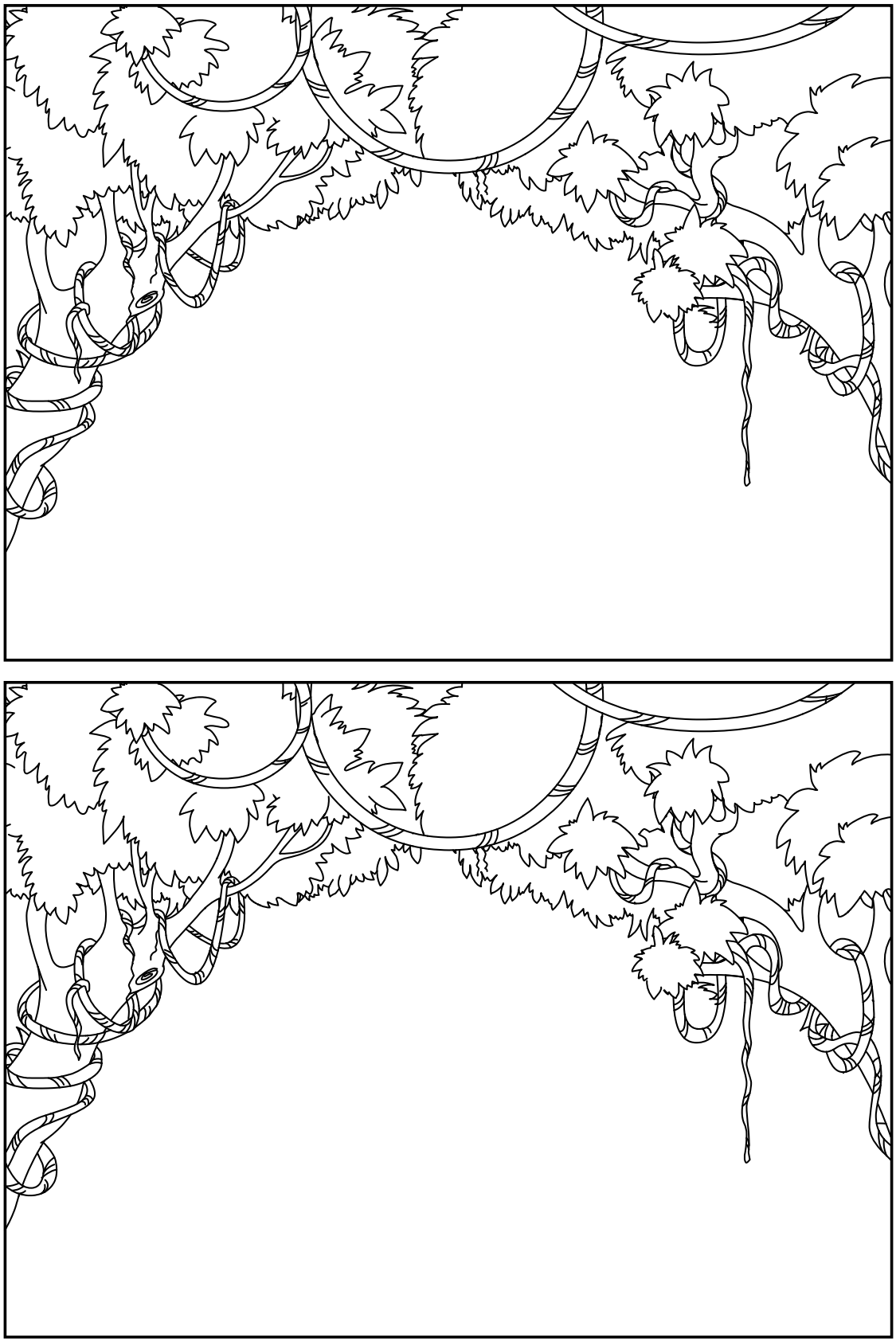
Literacy Connections:

- *Over in the Jungle: A Rainforest Rhyme* by Marianne Berkes
  (This book is similar to the poem, *Over in the Meadow*. It can be used to provide story language and background knowledge about jungle animals. Students can also tell stories about the groups of animals seen within the book.)
- *Ten Red Apples* by Pat Hutchins
  (Take away one item at a time. Also available on YouTube).

Solutions:

All problem results should be less than ten.

Blackline Master: Story situation mat



Ocean Stories

Common Core Standard:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Additional/Supporting Standard(s):

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

K.OA.5 Fluently add and subtract within 5.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

Student Outcomes:

- I can use addition and subtraction to solve problems.
- I can use strategies to solve problems (such as counting on, counting back, making ten).
- I can explain my strategy and reason for using it with others.

Materials:

- Math notebooks or paper to record work
- Blackline Master: Story mats
- 10 manipulatives per student (counters, snap cubes, beans, bears, buttons) possibly placed into bags before lesson to maintain a focus on ten

Advance Preparation:

Materials Preparation:

- Have materials easily available for students to use.
- Prepare story mats for each student.

Thinking Preparation:

- Create list of problems students will use during whole group (utilizing chart Common Addition and Subtraction Situations)
- CCSS-M states, "Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required." It is not until first grade that the "understanding of the equal sign" is an expectation.
- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/) Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects.
- Anticipate misconceptions listed below.

Directions:

1. Gather students at the carpet.
2. Using SMART board, white board and manipulatives provide students with story situation. "Four crabs sat on a treasure chest. Two are red and the rest are yellow. How many crabs are yellow?"
3. Ask students to restate the problem in their own words. Students "unpack" the problem (give the information they know about the problem from reading it.)
4. Have students suggest "possible" answers and justifying their response.
5. Allow student leader to model solving above problem and discussing his/her thinking. Monitor use of strategies (Student can solve problem as 2+_=4 or 4-2=__. These two strategies will need to be introduced and modeled several times for some students to comfortably go between the two strategies.)
6. Continue with a focus on Put Together/Take Apart and Addend Unknown type problems like:
    a. Seven fish were in the treasure chest. Five are blue and some are red. How many fish are red?
    b. There are ten seahorses in the seaweed. Six seahorses are brown and some are yellow. How many seahorses are yellow?
    c. There are seven starfish. Four are yellow and some are orange. How many are orange?
    d. There are eight sharks. Two are Great White sharks and some are Hammerheads. How many sharks are Hammerheads?
7. Students will suggest "possible" answers and utilize manipulatives to model their thinking. Teacher is facilitating as students share their strategies for solving and reasoning.
8. Students are given a story situation mat and manipulatives to begin telling their own story situations.
    a. Some students may try to write equations to represent their drawings, see thinking preparation above for note about equation expectations.
    b. Teacher should circulate and monitor students use of Put Together/Take Apart and Addend Unknown type problems. Teachers should make note of students' abilities and strategies (Does the student need to count from one to find the total? Can the student start at the first addend and count on? Is the student familiar with number partners and can quickly identify the sum?)
    c. Encourage students to record drawing representation in math notebook. While observing, identify students who can share specific story situations they created when the class is brought back together. Decide the order for students to share with the group based on use of strategies. Decide the sharing order for selected

students beginning with a student who has a simple solution and progressing to students with more complex solution strategies. This allows students to visualize connections and relationships in solution strategies.

9. Students clean up materials and are brought back together. Pre-selected students can share the story situation they created and how they came to their answer. Teacher will use questions below to facilitate as students discuss how the drawings and strategies are alike and different. It is important for the teacher to allow students who have been selected to share to do most of the talking, with teacher offering support and clarification if needed.

Questions to Pose:

Before

- What can you tell me about this problem?
- What are you being asked to find?
- What are some ways you can show your mathematical thinking when you work on this problem?

During

- Tell me about your thinking.
- Retell the problem again for me. What are you wanting to find?
- What tool did you decide to use for this problem? Why did you select it?
- What would happen if …?
- How can you show that solution on paper for others to see?
- How can you represent this problem to make someone else understand it?

After

- Tell the group how you solved it? What did you do first? Why? What did you do next? Why?
- What was your mathematical thinking for this problem?
- How do the student leaders' problems compare to our original problem?
- In the problems we have focused on today, what have we been asked to find? (May need to show previous work samples)

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Students have difficulty with one to one correspondence.	During independent practice, focus on touching each manipulative and sliding it away from the group to create a new pile that has been counted.
Students try to show numbers to represent some.	Discuss with students that "some" could be various numbers and we need to leave a blank place to come back to when we have more information.
Students focus on difference or sum as the answer instead of identifying the addend or amount taken away as the answer. (Example: There were 5 stars. 3 are red and some are blue. How many are blue? Student solves problem to identify 2 are blue but then answers 5.	Ensure student's groups have space in between and can easily be distinguished. Repeat the story situation touching each group when repeating the story. Repeat the answer drawing student's attention to the specific group.

Special Notes:

- This lesson can be repeated as need to encourage mastery and fluency with this type of problems.
- This lesson can also be repeated and students work with a partner. Partner one can tell the situation while partner two solves and then switch to continue practice solving problems. Other story situation mats can be used to allow students various story situations settings.
- Directions for this activity and mats can be sent home for students to practice as homework.
- The format of this lesson can be reproduced and substitute problem types to focus on the other addition and subtraction story situations.

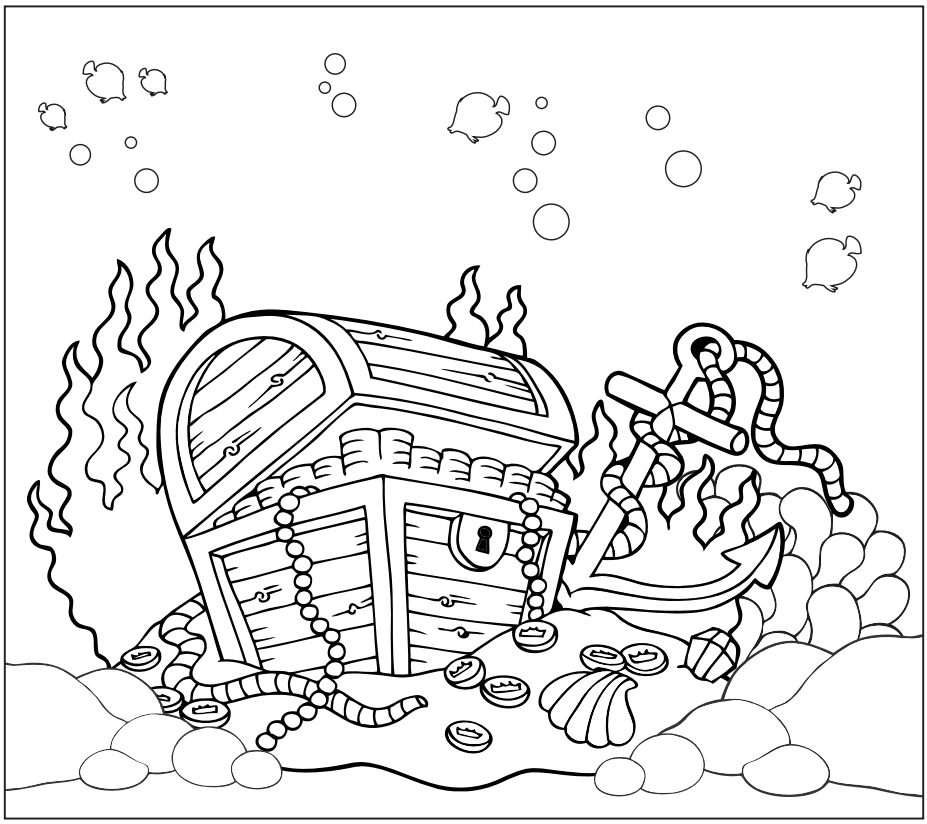
Literacy Connections:

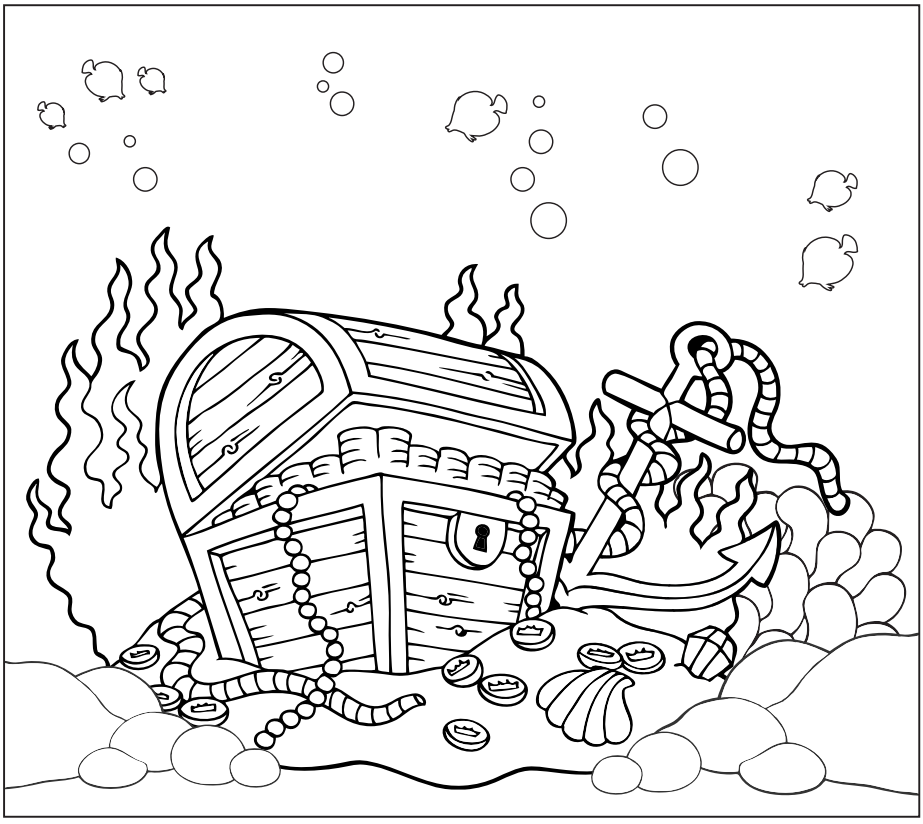
- *Fish Eyes* by Lois Ehlert
- *Over in the Ocean: In a Coral Reef* by Marianne Berkes
- *Peep in the Deep: Sea Creature Counting Book* by R.M. Smith

Solutions:

All student sums or differences should be ten or less.

Blackline Master: Story situation mat





Pond Stories

Common Core Standard:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Additional/Supporting Standard(s):

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5=2+3 and 5=4+1).

K.OA.5 Fluently add and subtract within 5.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

Student Outcomes:

- I can use addition and subtraction to solve problems.
- I can use strategies to solve problems (such as counting on, counting back, making ten).
- I can explain my strategy and reason for using it with others.

Materials:

- Math notebooks or paper to record work
- Blackline Master: Story mats
- 10 manipulatives per student (counters, snap cubes, beans, bears, buttons) possibly placed into bags before lesson to maintain a focus on ten

Advance Preparation:

Materials Preparation:

- Have materials easily available for students to use.
- Prepare story mats for each student.

Thinking Preparation:

- Create list of problems students will use during whole group (utilizing chart Common Addition and Subtraction Situation)
- CCSS-M states, "Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required." It is not until first grade that the "understanding of the equal sign" is an expectation.
- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/) Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects.
- Anticipate misconceptions listed below.

Directions:

1. Gather students at the carpet.
2. Using SMART board, white board and manipulatives provide students with story situation. "Two frogs sat on a lily pad. Four more frogs hopped there. How many frogs are on the lily pad now?"
3. Ask students to restate the problem in their own words. Students "unpack" the problem (give the information they know about the problem from reading it.)
4. Have students suggest "possible" answers and justifying their response.
5. Continue with a focus on Add to/Result Unknown and Put together/Result Unknown type problems like:
    a. One bee landed on the lily pad. Three more bees came to the lily pad. How many bees are on the lily pad?
    b. Six butterflies were at the pond. Two more butterflies came. How many butterflies are at the pond?
    c. Four yellow fish and one orange fish are in the pond. How many fish are in the pond?
    d. Two brown frogs and two green frogs are on the lily pad. How many frogs are on the lily pad?

    Students will suggest "possible" answers and utilize manipulatives to model their thinking. Teacher is facilitating as students share their strategies for solving and reasoning.
6. Students are given a story situation mat and manipulatives to begin telling their own story situations.
    a. Some students may try to write equations to represent their drawings, see thinking preparation above for note about equation expectations.
    b. Teacher should circulate and monitor students use of Add to/Result Unknown and Put Together/Result Unknown type problems. Teachers should make note of students' abilities and strategies (Does the student need to count from one to find the total? Can the student start at the first addend and count on? Is the student familiar with number partners and can quickly identify the sum?)

c. Encourage students to record drawing representation in math notebook. While observing, identify students who can share specific story situations they created when the class is brought back together. Decide the order for students to share with the group based on use of strategies. Decide the sharing order for selected students beginning with a student who has a simple solution and progressing to students with more complex solution strategies. This allows students to visualize connections and relationships in solution strategies.

7. Students clean up materials and are brought back together. Pre-selected students can share the story situation they created and how they came to their answer. Teacher will use questions below to facilitate as students discuss how the drawings and strategies are alike and different. It is important for the teacher to allow students who have been selected to share to do most of the talking, with teacher offering support and clarification if needed.

Questions to Pose:

Before

- What can you tell me about this problem?
- What are you being asked to find?
- What are some ways you can show your mathematical thinking when you work on this problem?

During

- Tell me about your thinking.
- Retell the problem again for me. What are you wanting to find?
- What tool did you decide to use for this problem? Why did you select it?
- What would happen if …?
- How can you show that solution on paper for others to see?
- How can you represent this problem to make someone else understand it?

After

- Tell the group how you solved it? What did you do first? Why? What did you do next? Why?
- What was your mathematical thinking for this problem?
- How do the student leaders' problems compare to our original problem?
- In the problems we have focused on today, what have we been asked to find? (May need to show previous work samples)

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Students have difficulty with one to one correspondence.	During independent practice, focus on touching each manipulative and sliding it away from the group to create a new pile that has been counted.
Students count the starting number when adding the second number. (If there are two ants and three more came, how many are there? Student places two ants then only adds one to make the three.)	Introduce strategy of using a space between two groups to see how many of each insect there should be. A popsicle or craft stick may also be used to show a break in the two numbers.

Special Notes:

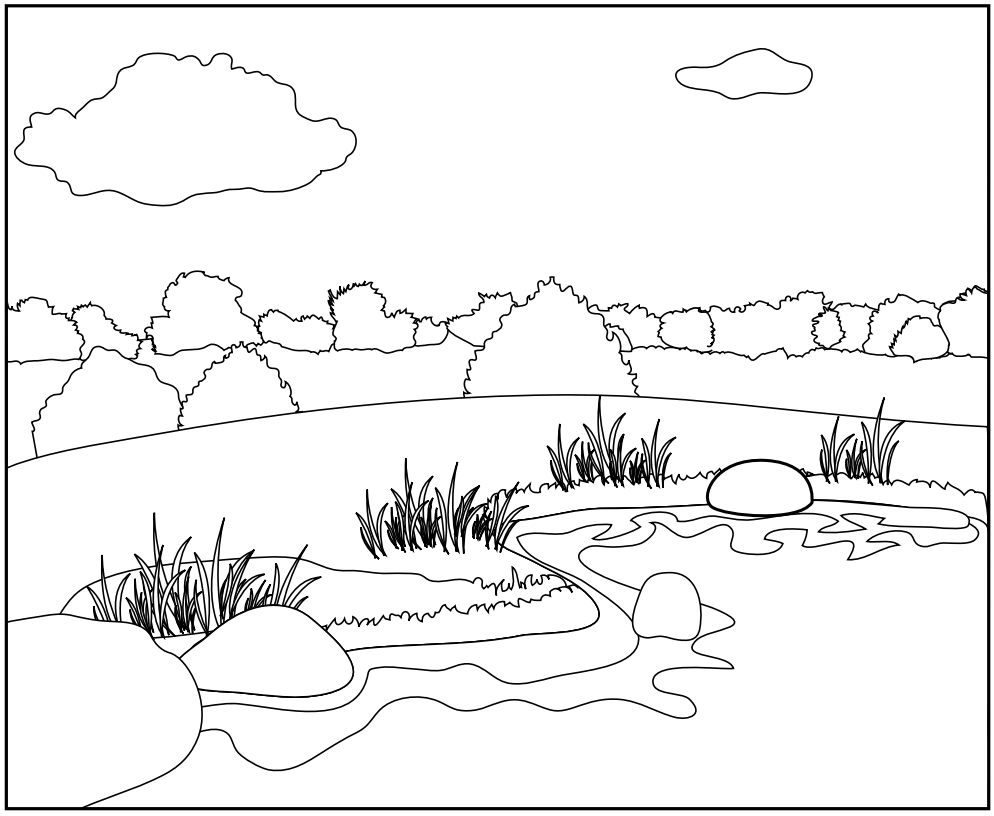
- This lesson can be repeated as need to encourage mastery and fluency with this type of problems.
- This lesson can also be repeated and students work with a partner. Partner one can tell the situation while partner two solves and then switch to continue practice solving problems. Other story situation mats can be used to allow students various story situations settings.
- Directions for this activity and mats can be sent home for students to practice as homework.
- The format of this lesson can be reproduced and substitute problem types to focus on Take From/Result Unknown and later Take Apart/Addend Unknown.

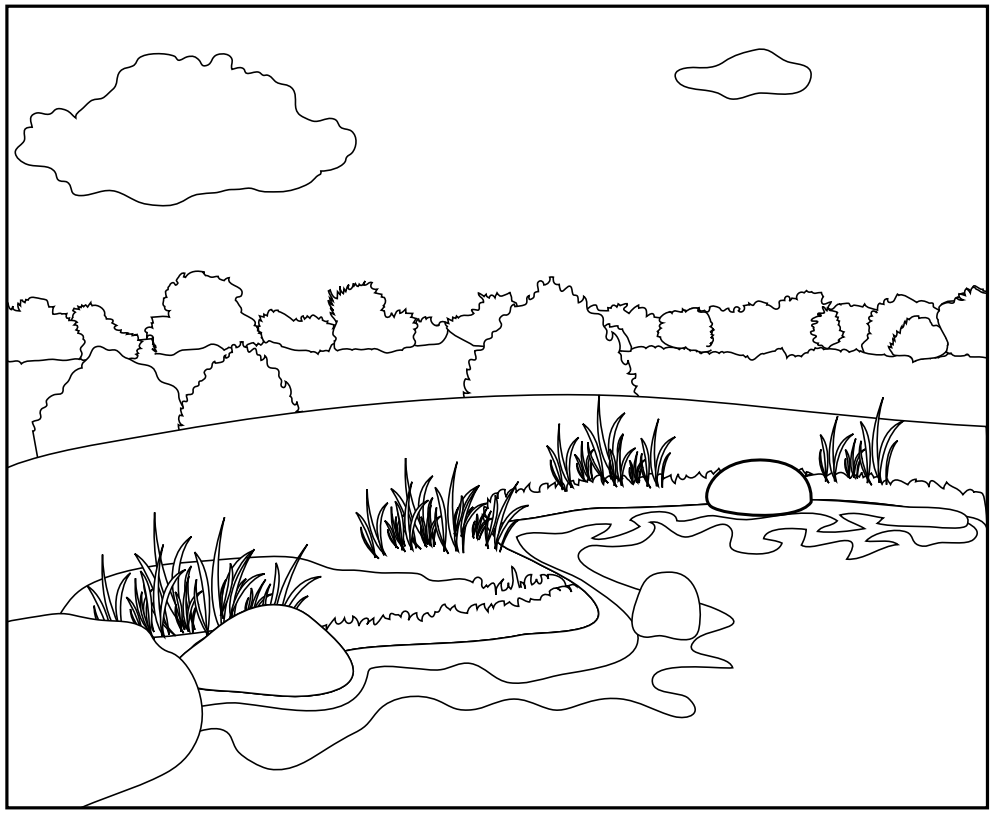
Literacy Connections:

- *In the Small, Small Pond* by Denise Fleming (Math situations can be told about each page)
- *In the Tall, Tall Grass* by Denise Fleming

Solutions: All student sums should be ten or less.

Blackline Master: Story situation mat





Name the Addend

Common Core Standard:

Count to tell the number of objects

K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g. by using objects or drawings, and record the answer with a drawing or equation.

Additional/Supporting Standard(s):

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5=2+3 and 5=4+1).

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
8. Look for and express regularity in repeated reasoning.

Student Outcomes:

- I can decompose a larger quantity into smaller groups of objects.
- I can apply my knowledge of how smaller groups of objects to combine to make larger sets.
- I can solve addend unknown problems.

Materials

- 1 cup (yogurt, plastic (not clear), etc.) per pair
- 1 bag of 10 counters per pair
- Math notebooks to record thinking
- 1 set of number cards per pair (to label addends)

Advance Preparation:

Material Preparation

- Gather cups, counter, and number cards in a bag per pair.
- Decide how game will be modeled (SMART board, document camera, board, etc.).

Thinking Preparation

- Make a list of students who are similar in ability levels.
- When circulating, plan to first visit/identify students will need the most support based on previous observations and assessments.
- Review standards for mathematical practice and select those that you will focus on during this lesson.
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects.
- Anticipate and plan for misconceptions listed below.

Previous Lessons

- Students will need multiple experiences with decomposing a ten into two addends.
- Students will need multiple experiences with the following standard:
  Know number names and the count sequence.
  K.CC.2 Count forward beginning from a given number within the know sequence (instead of having to begin at 1).

Directions:

1. Gather students on the carpet.
2. Begin by showing students a group of 10 objects.
3. Tell students that you are going to be playing a game that changes the arrangement of the group of 10 (If needed remind students that you are **not** taking away from the group of 10).
4. Select one student to assist and have the rest of the class close their eyes.
5. The selected student will cover/hide a portion of the group of 10.
6. Class will open their eyes, observe the group of 10, and then discuss with their partner what they think has happened. Teacher note: While students discuss listen for/model: "There are ___ left. So there must be ____ hidden to make 10."
7. Repeat with three to four more examples. As more examples are completed, introduce using the number cards to label each addend. This will develop a connection between the numerals and quantities represented in an equation.
8. Partner students and pass out supplies. Students should then return to their work spaces. Students will need to determine who is partner 1 and partner 2 in their game. Students should then play the game as demonstrated.
    - Teacher note: While playing the game the teacher should listen for using their knowledge of how sets work together and monitor for misconceptions.
        - While students are working, the teacher is observing students and making note of students' abilities and strategies.
        - While observing, identify two or three pairs who can share when the class is brought back together. Decide the order for pairs to share with the group based on use of strategies.
        - Students can use manipulatives, drawings, or number lines to confirm their thinking or as an additional support.
9. Ask students to record at least one problem solved in their math notebook. Students will then bring notebooks back to the carpet to share their math findings.
10. Have students clean up and return to the carpet. Students selected during observation will share and model their thinking. Students on the carpet can turn and share with their neighbor, using their math notebook.

Questions to Pose:

Before

These questions are important to emphasize developing a mental image of quantities smaller than ten.

- How many do we know is still here?
- Can we see the ten that is here?
- What quantity can we see?
- How can we figure out what is hidden? (counting on using fingers, known addends from previous experience)

During

- How did you find the hidden amount?
- What have we done previously that has helped you to figure out the hidden amount?
- How could you check your work?
- What must you know to solve the problem

After

- What representation could you use to help someone else understand?
- How did your thinking compare to your partner?
- How did your solution strategies compare to your partner?
- What information in the problem guided you to know that you had a reasonable answer?

Possible Misconceptions/Suggestions:

Misconceptions	**Suggestions**
Students are unable to use strategies to determine the quantity hidden.	Teacher can use a craft stick/pipe cleaner to show separate a group of ten into two smaller sets (decompose). Once student has seen the ten separated, cover one amount and have student articulate the amount hidden under the cup and how they figured it out.
When using fingers to check thinking, students count on but identify the sum as the missing addend. (ex: 6 are seen, 4 are hidden. Student counts: 7, 8, 9, 10 (while showing four fingers). And then answers 10.).	Teacher draws student's attention to the number of fingers that they are holding up and connect that to the number of counters hiding.

Special Notes:

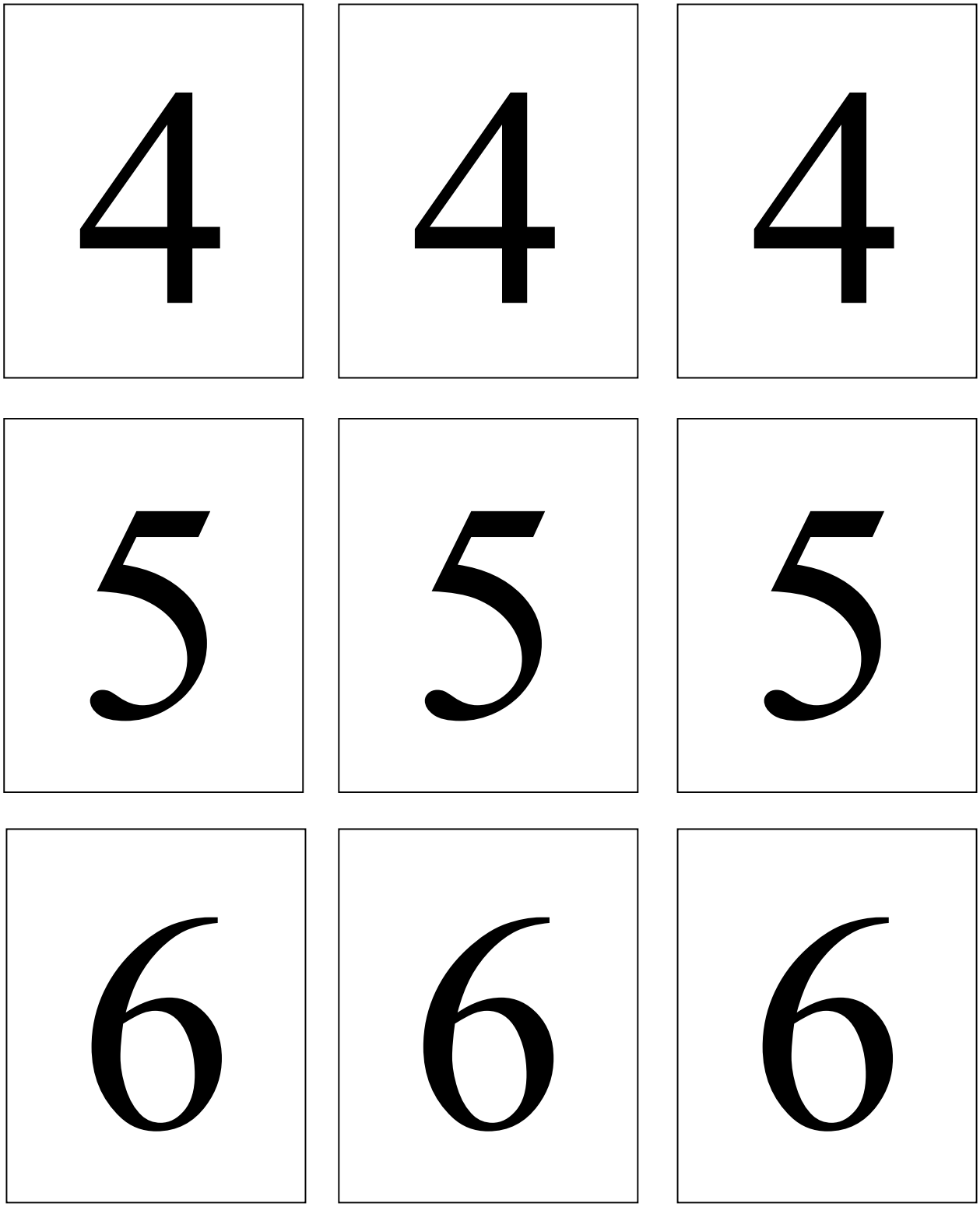
- Students will need multiple experiences with sets of objects to continue to increase fluency in naming addends of ten.
- Directions for this game can be shared with parents.

Solutions:

All addends should create a sum of 10.

Blackline Master: Number Cards

1	1	1
2	2	2
3	3	3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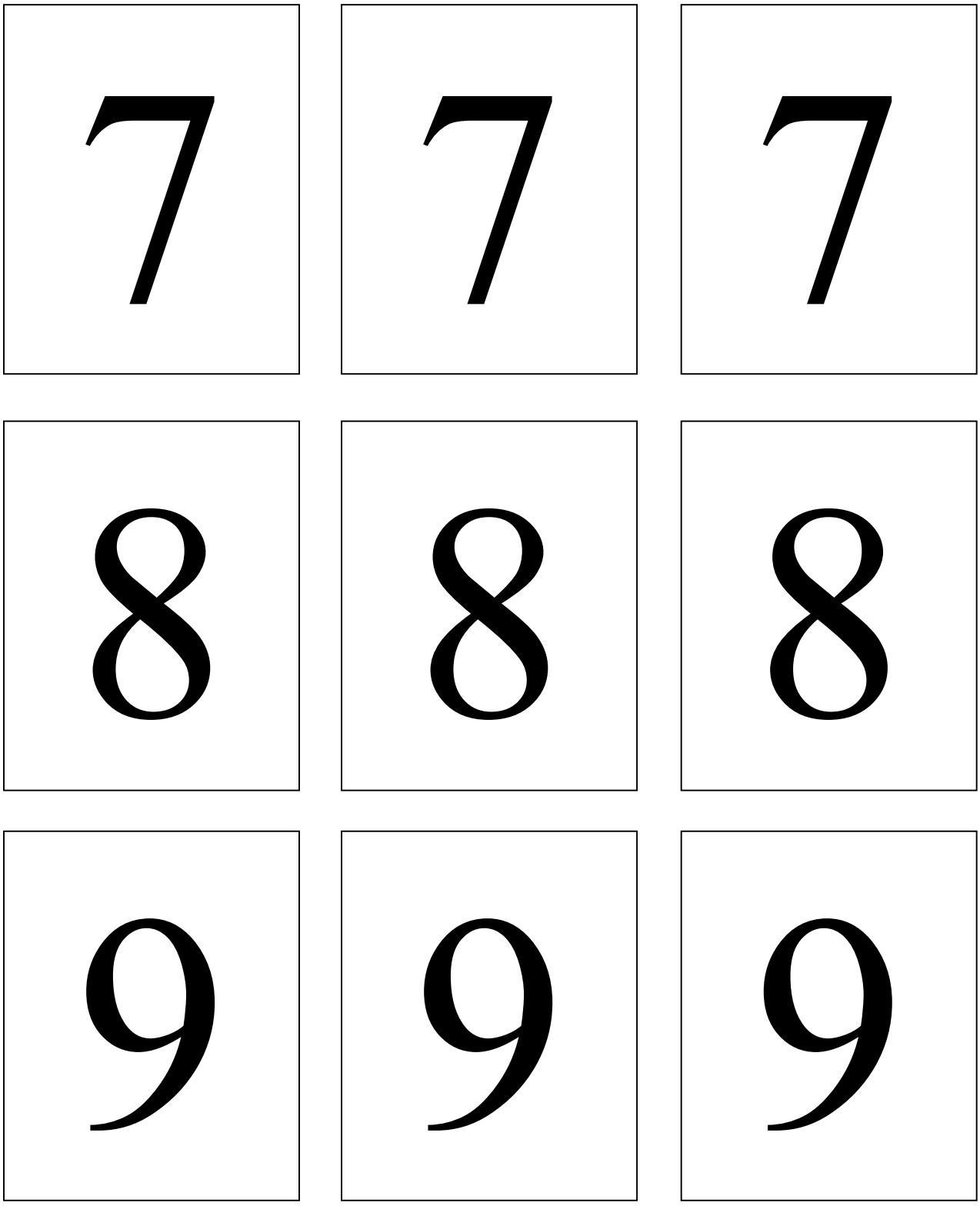
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Race to Five

Common Core Standard:

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.5 Fluently add and subtract within 5.

Additional/Supporting Standard(s):

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5=2+3 and 5=4+1).

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.

Student Outcomes:

- I can fluently add and subtract within 5.
- I can apply my understanding of how smaller sets make bigger sets to solve a take apart problem.

Materials:

- 1 game board per pair of students
- 6 counters per pair of students
- 1 set of game cards per pair of students
- Teacher will need a large game board and counters to model

Advance Preparation:

Material Preparation

- Game boards to be copied and paired with 6 counters and a set of game cards per pair.
- Teacher will need to create large game board on board or SMART board to be used during whole group.

Previous Lessons

- Students will need multiple previous lessons with exposure addition and subtraction to increase their fluency in addition and subtraction facts within 5.

Thinking Preparation

- Make a list of pairs of students who are similar in ability levels.
- When circulating, plan to first visit/identify students who need most support based on observations in previous lessons.
- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/) Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects.
- Anticipate misconceptions listed below.

Directions:

1. Gather students at the carpet.
2. Teacher will begin by reminding students of how they have been working with putting two numbers together to add to five. Teacher will introduce class to game board and give the following direction.
    a. Each partner will begin with a counter on zero on each number line. (Each student will have three counters on the game board.)
    b. Partner one will flip a card to reveal a number and can then move their counter that many spaces across a number line. Partner two will flip a card and then move their counter that many spaces across a number line. Students can start with any number line or go in any order.
    c. Partner one will flip a card again and can either move his or her first moved counter forward or move another counter forward on another number line.
    d. The goal is to get all three counters to the five before your partner to win.
    e. **Teacher will leave out strategy that a number can be broken into smaller numbers to be used on multiple number lines. (Example: You have a counter on three and pick four. You move the first counter forward two spaces to make five and then use the other two to move out a second counter.)**
3. Teacher will play first round of game on the board with teacher being partner one and the class being partner two. Allow student leader to go first for the class. Let the student leader decide which counter will be moved on the board.
4. The teacher will then roll and move out one counter (**not** using the strategy noted in 2e). Another student leader will pick a card again and move counter(s) the identified spaces.
5. Teacher will then pick a card and use strategy from 2e without explaining, and provide a pause for students to argue ability to break given number.
6. Teacher will facilitate math discussion by asking:
    a. What did I do?
    b. Why do you think I should not be able to do this?
    c. Did I still move the same amount?
    d. Would it be helpful to break the number depending on how more you need to get to five? (pose question: If I were on three and I got a five, why would it help me to break the number?)
7. Students pick another card and teacher can assist when needed to encourage students to use strategy noted in 2e. The game is continued until the teacher or class has all counters on five.

8. Students are then paired up and given their boards, counters and cards to begin playing with a partner.
    - Teacher note: While students are playing the game, the teacher is circulating and making note of students' abilities and strategies (Identify are the students able to decompose the number to utilize number partners; Do students need manipulative support to see how a number can be broken to further their counter on the board?)
    - While observing, identify pairs who can share when the class is brought back together. Decide the order for pairs to share with the group based on use of strategies (how they decomposed the number to utilize the addends).
    - As you are circulating, encourage students to use manipulatives as needed to see how a total could be decomposed into two addends.
9. Students clean up materials and are brought back together. Pre-select pairs can share how they determined which way they would decompose various numbers to help them win the game. Teacher will use questions below to facilitate math talk as students share experiences in the game.

Questions to Pose:

Before

- How could we use what we have practice with adding numbers in this game?
- What is the game asking you to do?
- What would happen if you had a counter on three and picked two?
- What strategies do you think you will use in this game?
- What would happen if you had a counter on two and picked one?

During

- What methods can you use to get your counter(s) to five?
- What are some numerical answers that make sense when answering the questions?
- What additional information did you need in order to be more successful with moving your counters?

After

- What must you know to win?
- What representation could you make for someone who is not sure how to decompose their number?
- Compare your thinking when we first introduced the rules of the game to after being able to decompose (break) the number.
- What problems have you done similar to these?

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Students are unable to decompose a number.	Encourage students to use manipulatives, to provide a visual.
Students have difficulty using a number line.	Game board can be folded to provide only one or two number lines to play on at a time.

Special Notes:

- To reinforce idea of adding and subtracting fluently within five, teacher and students should avoid decomposing a number into more than two addends.
- Extension: Students could play game one round where they are unable to decompose the number and then play a second round in which they can decompose the number. After playing both rounds, students will discuss how that affected the results of the game.
- Extension for:

  Count to tell the number of objects

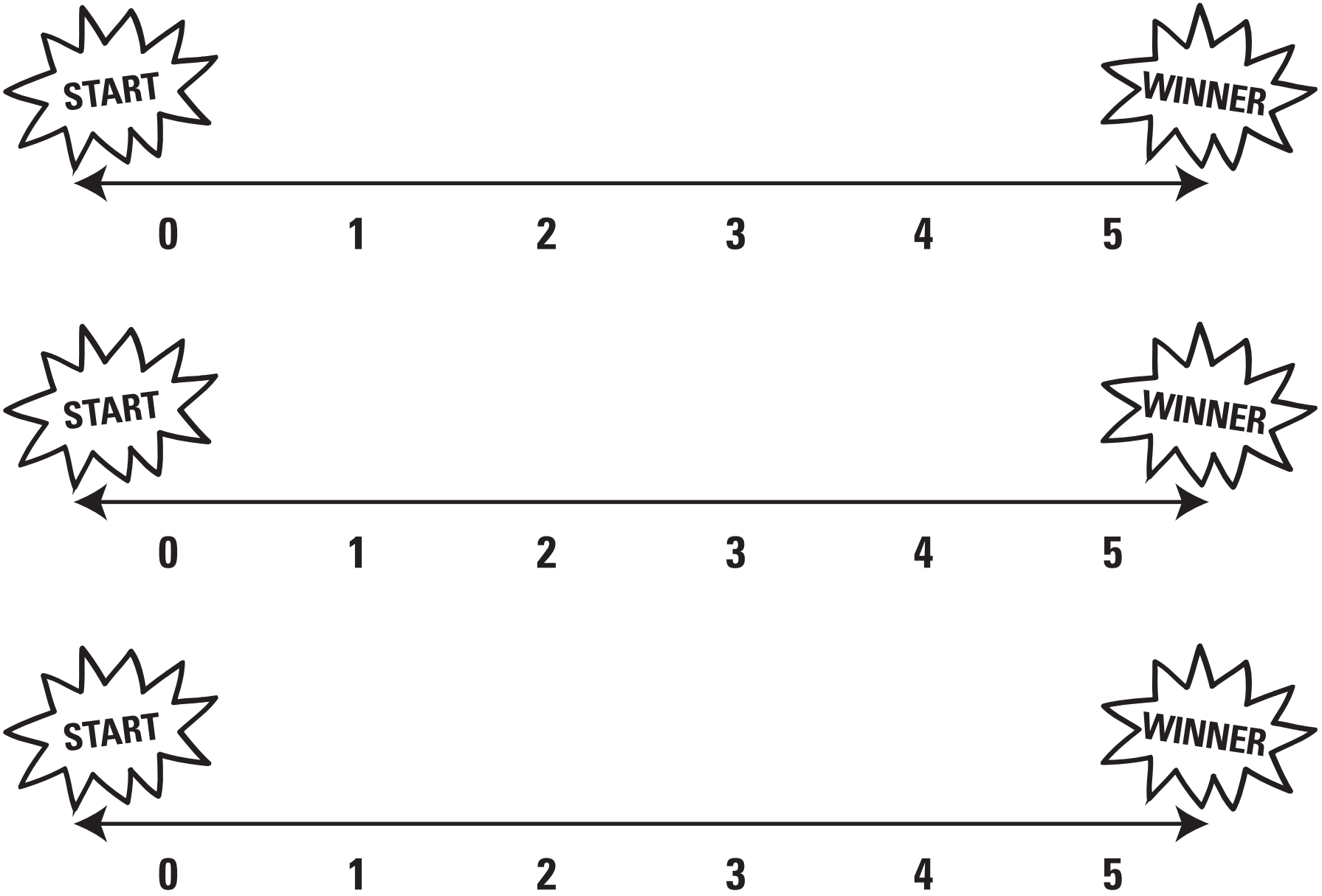
  K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g. by using objects or drawings, and record the answer with a drawing or equation.

  Students can use a dice (instead of cards) and extend game boards to ten to encourage students to practice using addends that combine to get ten.

Solutions:

- All solutions should be a total of five or under.

Race to Five Gameboard



Building Teen Numbers

Common Core Standards:

Work with numbers 11-19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 +8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight or nine ones.

Additional/Supporting Standards:

Know number names and the count sequence.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

b. 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.

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision
7. Look for and make use of structure.

Student Outcomes:

- I can use a ten frame to represent ten ones.
- I can verbalize that ten objects is the same as the number ten.
- I can model teen numbers as ten ones and some extra ones.
- I can demonstrate an understanding that one manipulative goes in each square (builds on one to one understanding).

Materials:

- Ten Frame (per student)
- 15 counters (per student)
- Teen Number Cards 11-15 (per student)
- Painter's tape to make ten frame on carpet (this ten frame will be used for following lessons, so it can be left on the floor)

Advance Preparation:

Materials Preparation:

- Create a ten frame in the middle of student's gathering place using painter's tape. Boxes should be large enough for students to stand or sit in.
- Each student will need a ten frame, 15 counters and a set of teen number cards put in a bag prior to the lesson beginning.
- Teacher will need a demonstration set for board or SMART board.

Prior Lessons:

- Students will be fluent with one to one correspondence to identify how many objects are in a group (up to ten).
- Students will have used ten frames with quantities one to ten.

Thinking Preparation:

- Review the Standards for Mathematical Practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the Critical Areas for Kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/)
- Plan for misconceptions listed below.
- In between building each number, clear board so students see ten ones going into ten frame each time to reinforce idea that only ten ones will fit in ten frame and to facilitate counting on from ten.

Directions:

1. Gather students at the carpet.
2. Ask ten students to stand up so they are visible to all (not using the ten frame).
3. Have a student leader count how many students are standing.
    a. Possible questions to pose: How do you know there are __ students? Could there be another way to figure out how many students are standing?
4. Draw students' attention to ten frame on the carpet. The teacher will facilitate and guide students to identify there are ten squares, only one item goes in each square, there are five in the top row and five in the bottom row.
5. Teacher and students work together to move students into the ten frame and count out loud as each one is added to the frame.
    a. Students should describe the difference in counting the group with and without the ten frame. (Students should quickly see there are ten because all squares are full.)
    b. Possible questions to pose: How did we fill the ten frame? What did we do as we filled the ten frame? How do we know how many are in the ten frame?
6. Choose 12 new students and have students put themselves into the ten frame one at a time. The class will verbally count as they go. Upon getting to 10, have students share what they notice and what can be done next. Students will identify they cannot fit in the frame and will be extra ones on the side.
7. Students will continue by making number 14 in same manner and share similar observations.
    a. Possible questions to pose: How did we fill the ten frame? What did we do as we filled the ten frame? How do we know how many are in the ten frame?

8. Students are given bag of manipulatives, teen number cards and a ten frame. Students will work for seven to ten minutes to build each teen number using the ten frame. Students will flip over a number and then build the number.
    a. During student's independent work, the teacher is walking around conducting informal observations of students' understanding and mastery of show teen numbers as ten ones and some extra ones.
    b. While observing, identify students who can share when the class is brought back together. Decide the order for students to share with the group based on use of strategies (for example: Students who began with a misconception and then problem solved to correct. Students who count by ones. Students who counted on from ten.)
9. Students are then brought back together.
10. Students identified by teacher observations during their work time will share strategies with the class.
    a. End lesson by reviewing students should be able to identify: How did we fill the ten frame? What did we do as we filled the ten frame? How do we know how many are in the ten frame? How do we know how many we have all together?

Questions to Pose:

Before:

- What can we do to figure out how many students are standing? (count each one, identify five and count on, etc.)
- How is 11 different than 10? (compare other totals to ten)

During:

- How does the ten frame help us to count?
- How did you build the number?
- How did you count?
- What happens when there are more than ten?
- How many did you have left over?
- Where can the extra ones go?

After:

- How did you count?
- What are some ways you built the various numbers?
- What do you do if you have more than ten?
- How is the number 12 different than 10?
- How is the number 15 different than 11?
- What do the numbers 11-15 have in common?

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
More than one manipulative can go in each square.	Remind students the ten frame is a tool to help us see how many. It is building on one to one and when we count using one finger we only touch one at a time.
Saying the filled ten frame is one instead of ten (ones).	Rebuild ten frame, and count each one as it is placed in the ten frame.
When identifying the total, student counts the ones on the ten frame (says ten), then counts the ones off the ten frame (says three) and identifies their total as three instead of 13.	Review counting across and down the ten frame and then ensuring they count on when counting the extras ones off the ten fame.

Special Notes:

Students will need repeated exposure in using ten frame and teen numbers to identify teen numbers as ten ones and some extra ones.

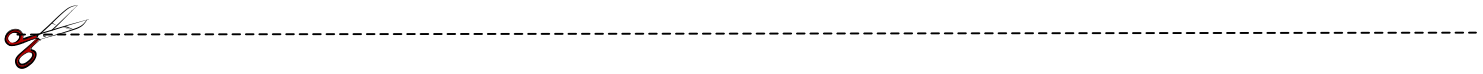
If lesson is repeated, *Sixteen Runaway Pumpkins* by Dianne Ochiltree can be read and instead of using counters, students could use small pumpkins in ten frame (pictures).

Solutions:

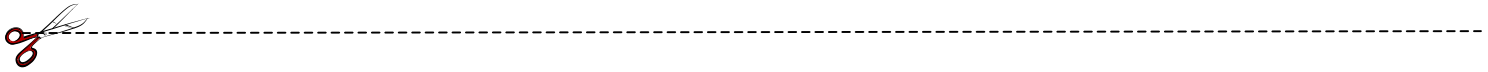
Students should identify teen numbers 11-15 as ten ones and some extra ones.

Blackline Master: Number Cards

11	12	13	14	15



11	12	13	14	15



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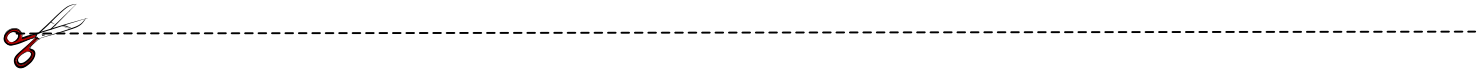

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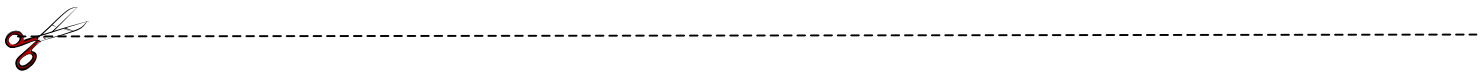

11	12	13	14	15

Blackline Master: Ten Frames

Name: _____ **Date:** _____

Assessment: Students will show the teen number as ten ones and some ones left over.

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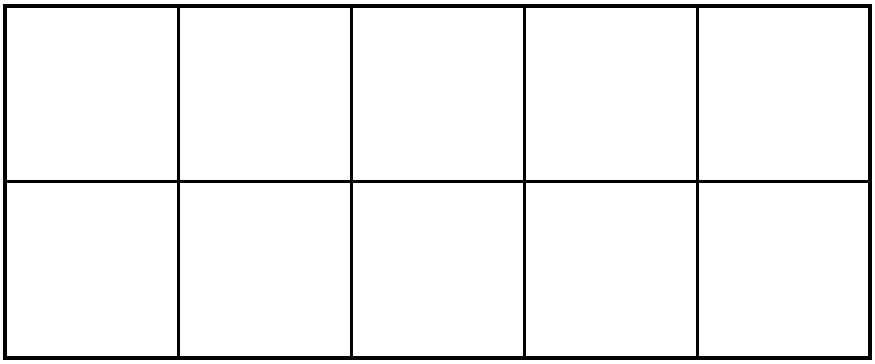

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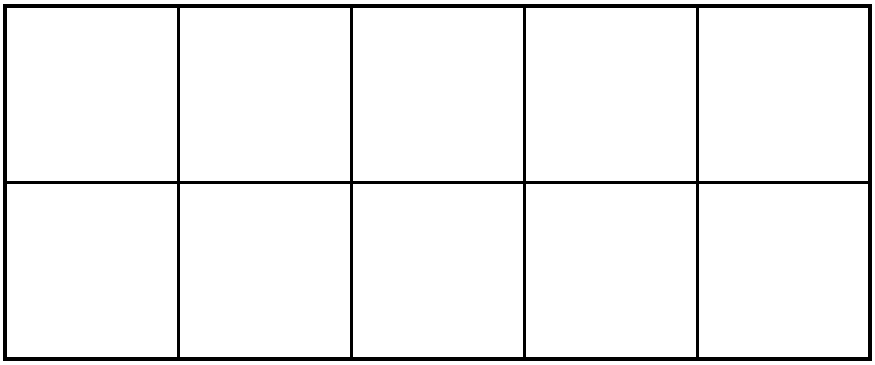
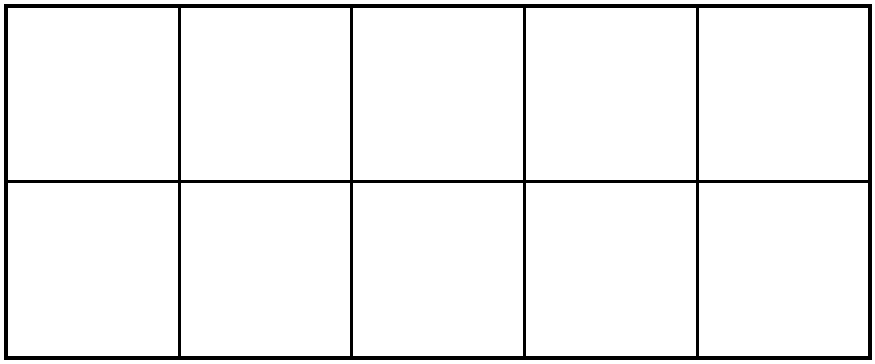


11



Label the Ten Frame

Common Core Standards:

Work with numbers 11-19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 +8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight or nine ones.

Additional/Supporting Standards:

Know number names and the count sequence.

K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

b. 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.

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

Student Outcomes:

- I can compose a teen number into ten ones and some extra ones.
- I can identify and record how many ones are on the ten frame, off the ten frame, and the total.
- I can explain how to create a teen number by using ten ones and some extra ones.
- I can understand how the ten ones and extra ones can be combined to make a total.

Materials

- Painter's Tape
- Ten frame (per student)
- 19 counters (per student)
- Teen number cards 11-19 (per student and teacher set)

Advance Preparation:

Materials Preparation:

- Prior to lesson, teacher will use painter's tape to create a ten frame on the floor large enough for a student to stand or sit in each box.

- Each student will need a ten frame, 19 counters (or other manipulative) and a set of teen number cards put in a bag prior to the lesson beginning.
- Teacher will need a set created for the board or masters below put on a Smartboard.

Thinking Preparation:

- Review the Standards for Mathematical Practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the Critical Areas for Kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/)
- Plan for misconceptions listed below.
- In between building each number, clear board so students see ten ones going into ten frame each time to reinforce idea that only ten ones will fit in ten frame and to facilitate counting on from ten.
- During whole group modeling encourage use of:
  "I have ten counters on the ten frame and ____ counters off the ten frame." This will enable students to move from manipulatives to representational drawings of teen numbers.

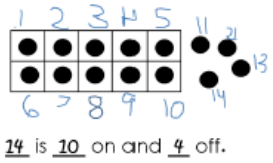
Prior Lessons:

- Prior to this lesson, students will be fluent with one to one correspondence to identify how many objects are in a group (up to ten).
- Prior to this lesson, students will have previously been exposed to creating teen numbers 11-15 using ten frames

Directions:

1. Gather students at the carpet.
2. Review how to create a teen number with students standing in the carpet ten frame.
3. Review filling the ten frame (left to right, top to bottom, one item per square).
4. After review, students can describe the total made by saying: "We had ten ones **on** the ten frame and ___ ones **off** the ten frame."
5. Build connection between oral and written number.
   - As class verbally counts, teacher gives students corresponding number card and student will hold up the number card.
   - Possible questions: Why does each person only get one number? What do you notice as we count? What do you notice about the ten frame when we build teen numbers?
6. Choose a new teen number to create.
7. Student leader will use plates to fill the ten frame and place extras on side (as practiced above in step 3).
8. Student leader will recount amount and place down corresponding number card.
9. Teacher will draw a representation of the number (on white board, SMART board), the class rote counts while the teacher writes the corresponding numeral for each counter (see image or page 13 unpacking document http://www.dpi.state.nc.us/docs/acre/standards/common-core-tools/unpacking/math/kindergarten.pdf)

Student Recording Sheets Example:



10. Students will be given number cards, counters, ten frames, and recording sheet (see attached) to practice creating, recording and labeling numbers using ten frame.
    a. While observing, identify students who can share when the class is brought back together. Decide the order for students to share with the group based on use of strategies (for example: Students who began with a misconception and then problem solved to correct. Students who count by ones. Students who counted on from ten.)
11. Students are brought back together.
12. Students identified by teacher observations during their work time will share strategies with the class.
    a. End lesson by reviewing students should be able to identify: How did we fill the ten frame? What did we do as we filled the ten frame? How do we know how many are in the ten frame? How do we know how many we have all together?

Questions to Pose:

Before:

- How can we use the ten frame to create teen numbers?
- Describe number _____ (ex: 16 can be shown by 16 ones; 10 ones and 6 extra ones, etc.)

During:

- How did you count?
- How could you label as you count?
- Why does it help you to label?

After:

- How did you build the number?
- What did you notice as you counted and labeled?
- How did you figure out how many you have?

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
More than one manipulative can go in each square.	Remind students the ten frame is a tool to help us see how many. It is building on one to one and when we count using one finger we only touch one at a time.
Saying the filled ten frame is one instead of ten (ones).	Rebuild ten frame, and count each one as it is placed in the ten frame.

Special Notes:

Based upon anecdotal notes, small groups can be created to be repeat this task as need for mastery

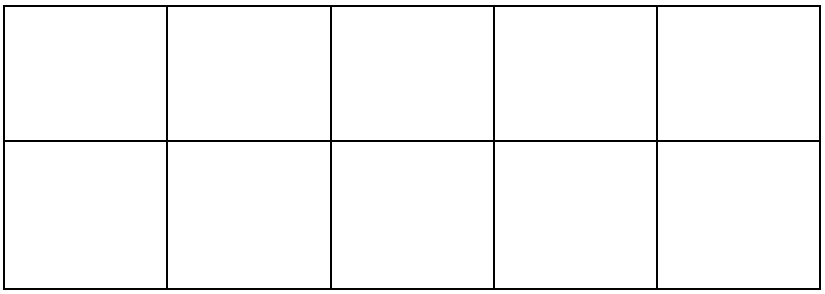
Solutions:

Students should identify teen numbers 11-19 as ten ones and some extra ones.

Name: _____

Blackline Master: Ten Frames Recording Sheet

_____



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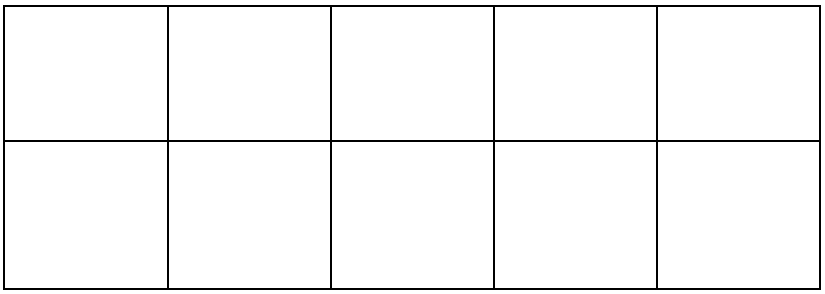

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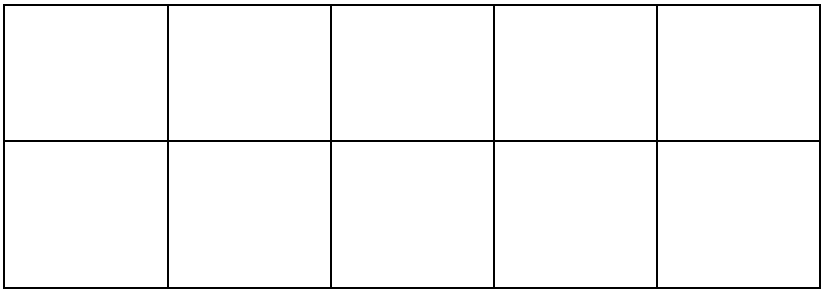

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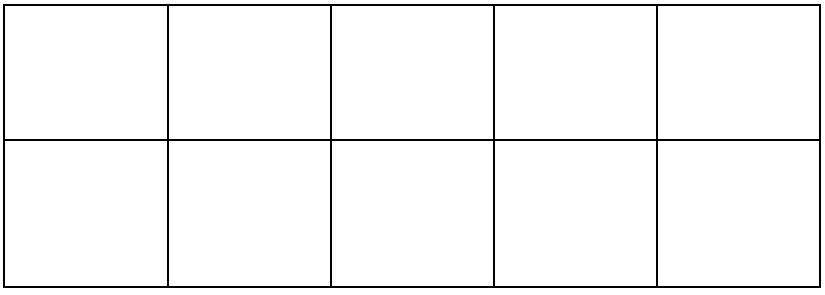
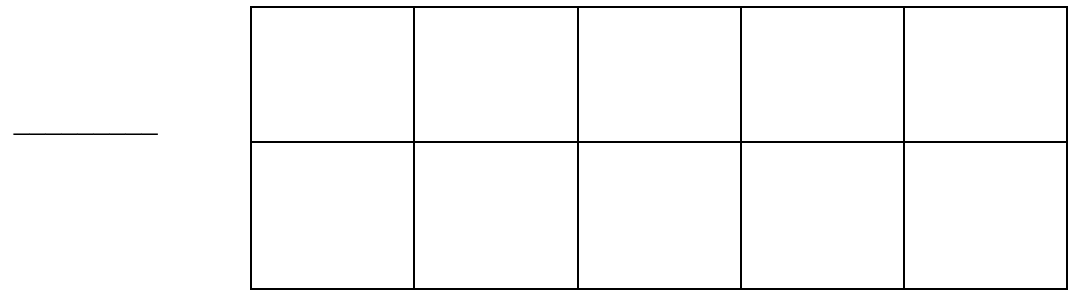
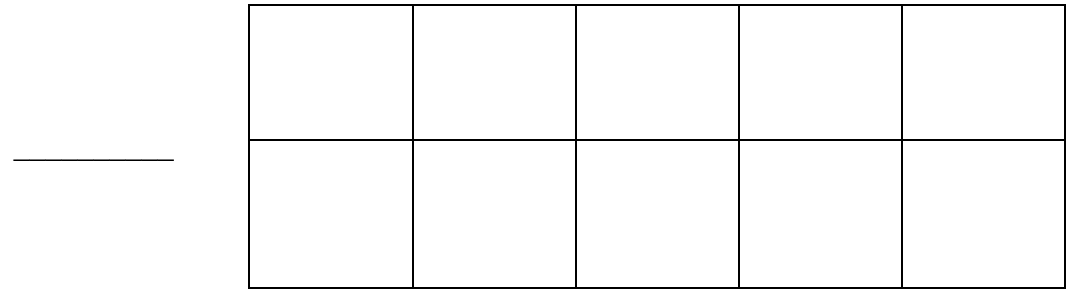
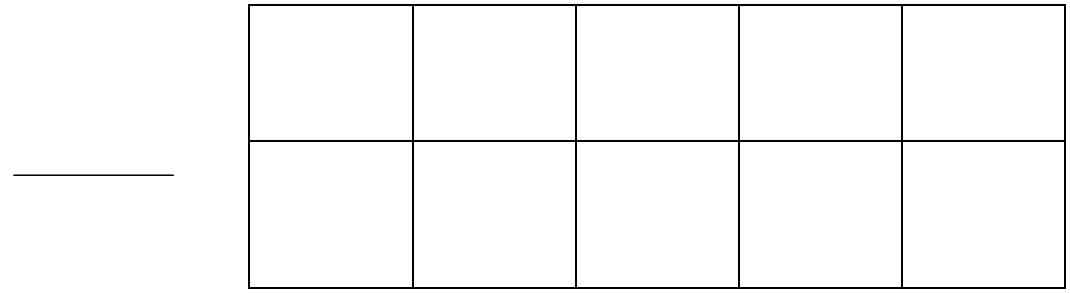
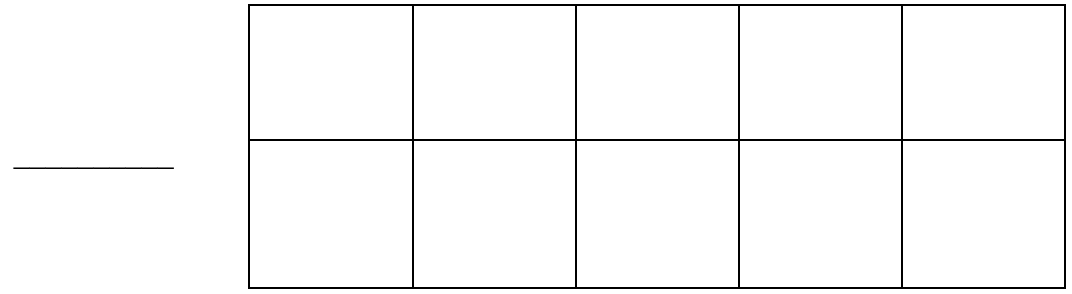




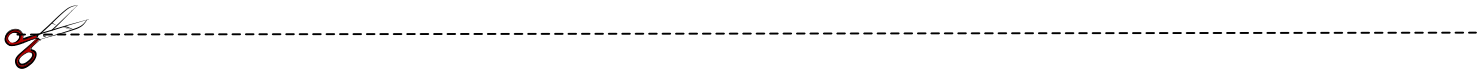




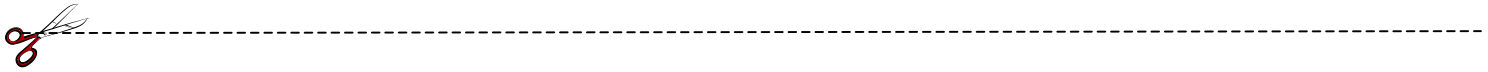


Blackline Master: Number Cards

11	12	13	14	15



11	12	13	14	15



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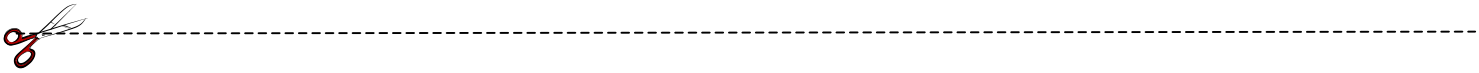
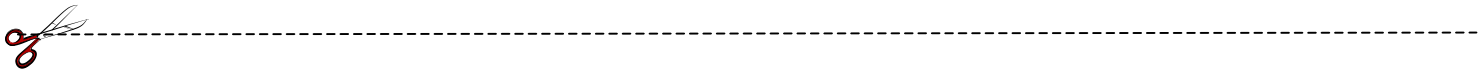


11	12	13	14	15



11	12	13	14	15

Mystery Number

Common Core Standard:

Work with numbers 11-19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g. by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g. 18=10+8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Additional/Supporting Standard(s):

Know number names and the count sequence.

K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.

b. 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.

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

Student Outcomes:

- I can organize a quantity of objects into ten ones and some extra ones.
- I can understand how ten ones and some extra ones can be combined to make a total.
- I can count on from a starting point of ten to determine how many there are all together in a group.
- I can describe how teen numbers are composed of ten ones and extra ones.
- I can compare tell how two quantities are the same and different (example: One group of seventeen ones verses a group of ten ones in a ten frame and seven ones on the outside of the frame.)

Materials:

- Basket at each table with ten frames, baskets of manipulatives (bears, beans, buttons, etc.) and string large enough to ring a group of ten manipulatives
- Number cards for students to use as "mystery number."

Advance Preparation:
Material Preparation:

- Each table should have a basket with multiple ten frames, baskets of manipulatives and strings for students to choose from when creating number representations (all materials have been introduced in previous lessons).
- Place a number face down at table spots for each pair of students (paper can be a different color to show difference from number cards)

Thinking Preparation:

- Prepare a list of student pairs.
- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/)
- Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects. (Unpacking Document p.5)

Directions:

1. Gather students at the carpet.
2. Teacher instructs students there is a mystery number at their table. They are to partner up, identify their number, count out the corresponding quantity of manipulatives, and use the tools at their table to represent each number in a variety of ways.
3. Students are assigned partners and then move to tables. Students work with their partner to identify their given mystery number and then count out the corresponding number of manipulatives (example: This is the first way that students could represent the given quantity—a group of 17 ones).
4. Once students have shown one way to demonstrate the quantity, have students count out a second group of the same quantity of manipulatives (first quantity is left out in order to compare to second quantity). This time students should use a different strategy/structure to model the same quantity.
    a. Teacher note: While students are working, teacher should monitor for at least three different representations of thinking
        i. Quantities counted by ones
        ii. Quantities created using ten ones and extra ones (with the tens frame)
        iii. Quantities created using ten ones and extra ones (with the ringing strategy)
5. After a few minutes have students stop work. They should then look at their two models and describe to their partner what they did. While describing their models, students should identify the likenesses and differences between the two representations.
    a. Teacher note: While students are creating quantities, the teacher is circulating and making note of students' abilities and strategies.
    b. While observing, identify pairs who can share when the class is brought back together. Decide the order for pairs to share with the group based on use of strategies.
6. Bring students all back together to the carpet and use pairs to model the 3 ways to represent a teacher chosen quantity (I could create 15 as 15 ones, 10 ones on the tens frame and 5 off, 10 ones inside the ring and 5 outside the ring, etc.)

7. Facilitate a conversation using questions below for students to identify how the representations of the quantities are the alike and how they are different.
8. Student pairs are then given a new mystery number and return to work tables. Students are responsible this round for creating the number using all three strategies. (Students can also use paper or math notebooks to record their answers and methods.)
    a. Teacher note: While students are creating quantities, the teacher is circulating and making note of students' abilities and strategies.
    b. While observing, identify pairs who can share when the class is brought back together. Decide the order for pairs to share with the group based on use of strategies.
9. Students clean up materials and are brought back together. Pre-select three students to draw a different representation on the board showing the same quantity. Teacher will use questions below to facilitate as students discuss how the drawings and strategies are alike and different.

Questions to Pose:

Before:

- What ways can we use to create quantities of various numbers?
- How would you show __?

During:

- Tell me about the strategy you choose.
- How is yours the same or different from your partners?
- What other strategy can you use next?

After:

- How are the drawings/representations alike?
- How are the drawings/representations different?
- Does the quantity change when the representation looks different? (conservation of number)

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
If students place more than ten objects inside the ring	• Return to the use of a ten frame to continue practicing organizing a group of ten ones to confirm an understanding of the quantity of the collection. • On an individual basis revisit the importance of identifying groups of ten ones while counting larger sets of objects—practice with student as needed
When students do not include all objects that are outside the ring in their count. (example: There are four ones outside the ring. Teacher asks, "How many are outside the ring?" Student replies two.)	• Help students to group manipulatives outside of the ring together to encourage students to count all manipulatives outside of the ring.

Special Notes:

- Extension: Students can write in notebook how quantity representations are alike and different in their math notebooks.
- This task may require multiple exposures in order to facilitate complete understanding.
- To link to K.CC.5 and answer "how many?" students can place manipulatives in a line, rectangular array or a circle. Students can compare and contrast the various organizational methods.

Solutions:

- Students should be able to identify teen numbers as a group of ten ones and some extra ones using a variety of representations.

On and Off the Ten Frame

Common Core Standards:

Work with numbers 11-19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 +8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight or nine ones.

Additional/Supporting Standards:

Know number names and the count sequence.

K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

b. 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.

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

Student Outcomes:

- I can verbalize that ten objects is the same as the number ten.
- I can compose teen numbers as ten ones and some extra ones.
- I can demonstrate an understanding that one manipulative goes in each square (builds on one to one understanding).
- I can identify and record how many ones are on the ten frame, off the ten frame, and the total.
- I can explain how to create a teen number by using ten ones and some extra ones.
- I can understand how the ten ones and extra ones can be combined to make a total.

Materials:

- Painter's Tape to make a ten frame prior to lesson
- Sentence Strip with "___ is ___ on and ___ off"
- Blackline Master: Recording Sheet
- Ten Frame per student
- 19 counters per student

Advance Preparation:
Materials Preparation:

- Using painter's tape, create a ten frame on the floor large enough for one student to stand or sit in each box.
- Create sentence strip "___ is ___ on and __ off" and place in location all students can see.
- Each student will need a ten frame and 19 counters put into a bag prior to lesson.
- Students will need a recording sheet.
- The teacher will need a ten frame and manipulatives to use on the board or SMART board during whole group demonstration.

Thinking Preparation:

- Review the Standards for Mathematical Practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the Critical Areas for Kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/
- In between building each number, clear board so students see ten ones going into ten frame each time to reinforce idea that only ten ones will fit in ten frame and to facilitate counting on from ten.
- During whole group modeling encourage use of:
  "I have ten counters on the ten frame and ____ counters off the ten frame." This will enable students to move from manipulatives to representational drawings of teen numbers.
- Plan for misconceptions listed below.

Prior Lessons

- Previously taught lesson where student used manipulatives to show a representation of the number and then verbalized how many were on the ten frame and how many were off the ten frame.

Directions:

1. Gather students at the carpet.
2. Briefly practice creating teen numbers using the ten frame on the floor.
   - Possible questions: How many students are standing **on** the ten frame? How many students are standing **off** the ten frame? How many are there all together?
3. Once students are in place, teacher will review that there is a written number that matches the verbal number. Point out this is another way to find out how many we have.
4. As class verbally counts, the teacher will hand each student an index card with a corresponding number. Each student should hold the card so it is visible to the class. (Teacher should go left to right and then down when modeling counting how many.)
5. Student leaders will identify how many are on the ten frame and how many are off the ten frame.
6. Explain to students we will record our verbal answers into a sentence. Introduce sentence strip "___ is ___ on and ___ off" (example: 14 is 10 on and 4 off).

7. From last number modeled, identify how many there are all together and teacher records; how many are on the ten frame and teacher records; how many are off the ten frame and the teacher records.
    - Repeat with two or three more student leaders as needed. During this time focus on answering the above questions to reinforce how many are on, off and total. While practicing, student leaders continue to provide students on and off the ten frame with a corresponding number. Student leader will record class' verbal answers into "___ is ___ on and ___ off" sentence.
8. Teacher will pass out students' counters, ten frame and recording sheet. With teacher guidance, students will work with individual materials to complete an example teen number.
    a. As needed, the teacher can continue to support and model using board or SMART board. When students are able to practice, the teacher is circulating and making note of students' abilities and strategies.
    b. While observing, identify students who can share when the class is brought back together. Decide the order for students to share with the group based on use of strategies (for example: Students who began with a misconception and then problem solved to correct. Students who count by ones. Students who counted on from ten.)
9. Students are then brought back together.
10. Students identified by teacher observations during their work time will share strategies with the class.
    - End lesson by reviewing students should be able to identify: How did we fill the ten frame? What did we do as we filled the ten frame? How do we know how many are in the ten frame? How do we know how many we have all together?

Questions to Pose:

Before:

- How have we used the ten frame to help us show teen numbers?
- What have we noticed about building teen numbers?
- What strategies can we use to identify how many we have?

During:

- How many students are standing **on** the ten frame?
- How many students are standing **off** the ten frame?
- How many are there all together?
- "__ is ___ on and __ off"

After:

- What do we notice about building teen numbers and using the ten frame?
- "__ is __ on and __ off"

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Saying the filled ten frame is one instead of ten (ones).	Rebuild ten frame, and count each one as it is placed in the ten frame.
Students have difficulty filling in "__ is __ on and __ off."	Continue to practice labeling each one. Student recording sheet can also be differentiated to provide blank under ten frame and blank under extra ones to focus on identifying those two amounts.

Special Notes:

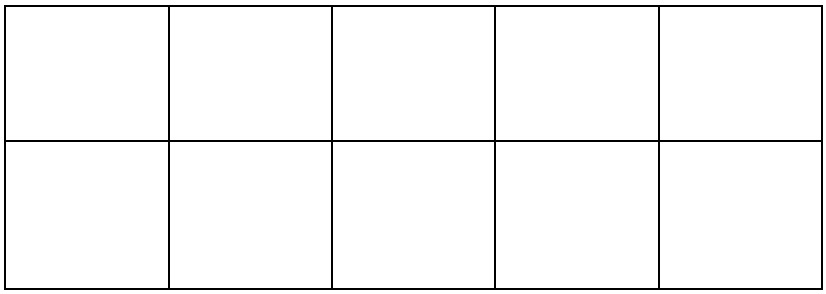
See differentiated recording sheets for various student's abilities.

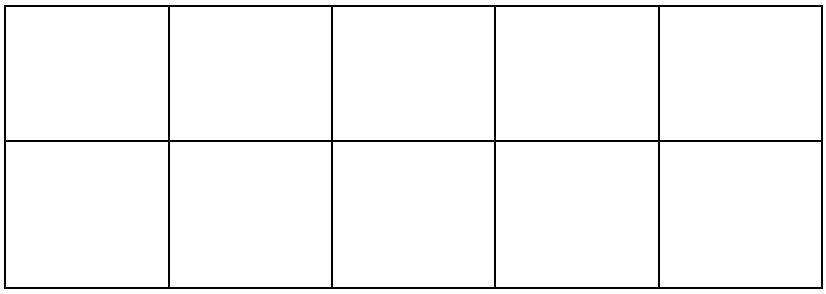
Solutions:

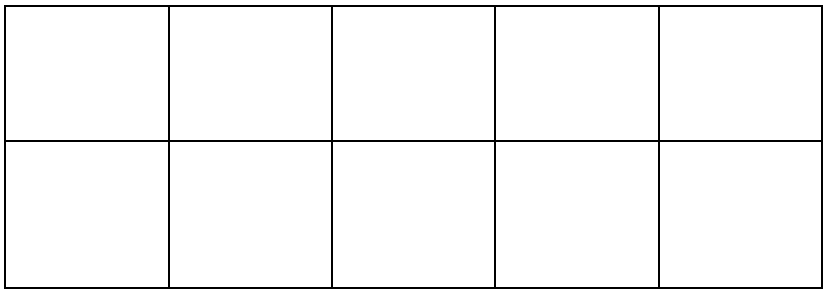
Students should be able to identify there are ten ones on the ten frame, __ones off the ten frame and together they make __.

Name: _____

Blackline Master: Ten Frames
Recording Sheet (option 1)

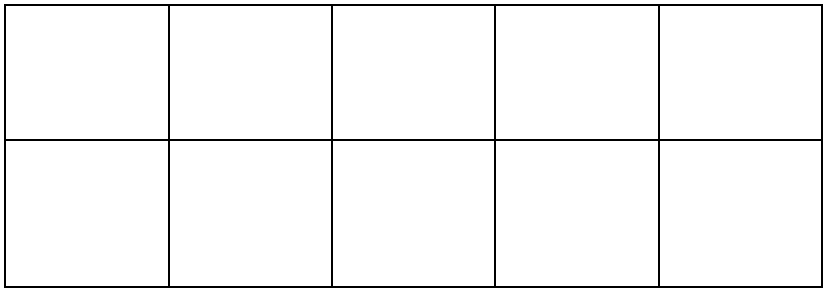




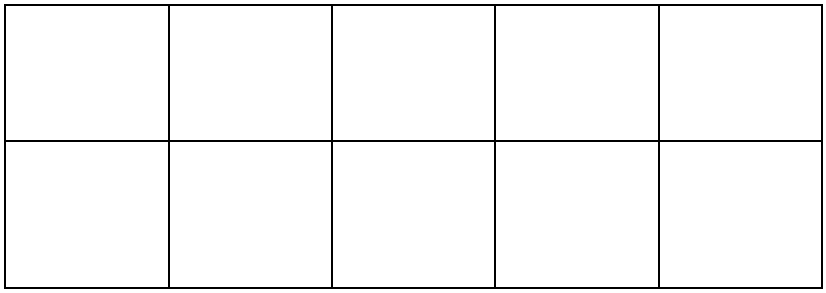


Name: _____

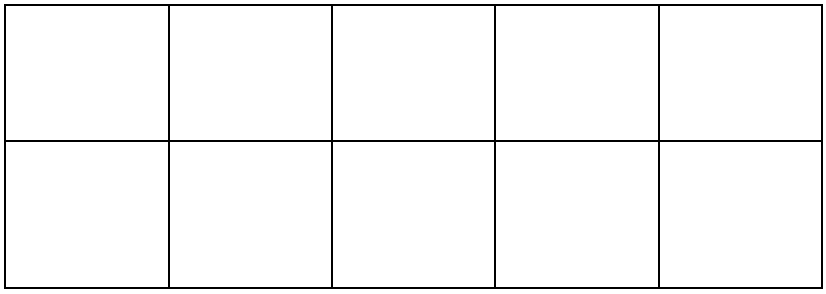
Blackline Master: Ten Frames
Recording Sheet (option 2)



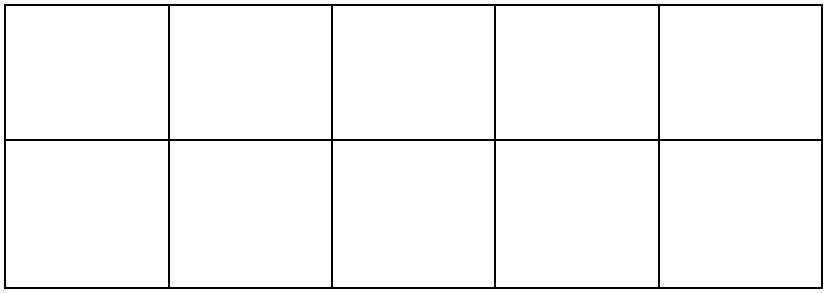
_____ is _____ on and _____ off.



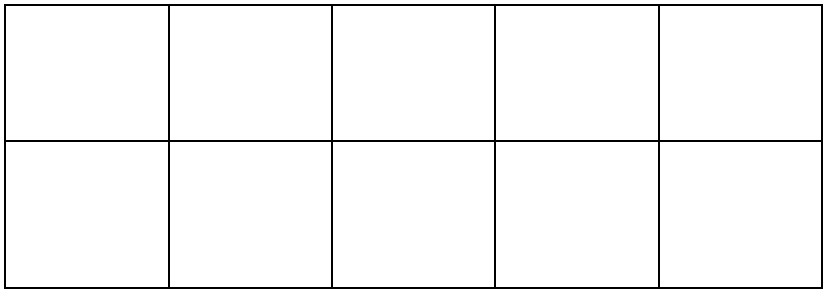
_____ is _____ on and _____ off.



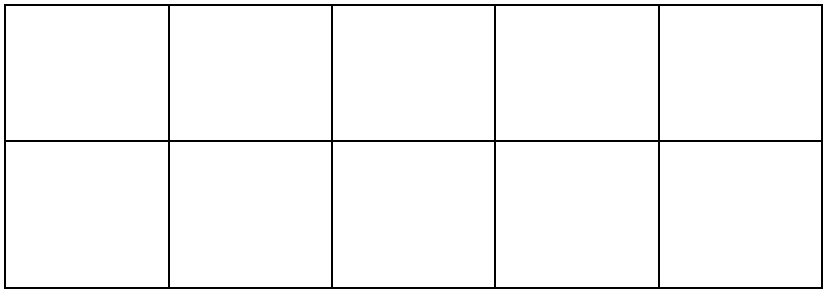
_____ is _____ on and _____ off.



_____ is _____ on and _____ off.



_____ is _____ on and _____ off.



_____ is _____ on and _____ off.

Ring Around the Tens

Common Core Standard:

Work with numbers 11-19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g. by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g. 18=10+8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Additional/Supporting Standard(s):

Know number names and the count sequence.

K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

b. 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.

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

Student Outcomes:

- I can organize a group of objects into ten ones and some extra ones.
- I can understand how ten ones and some extra ones can be combined to make a total.
- I can count on from a starting point of ten to determine how many there are all together in a group.
- I can describe how teen numbers are composed of ten ones and extra ones.

Materials:

Per **pair** of students

- 1 bag of 11-19 items
- Pre-counted groups of 19 objects in cups (ex: 19 buttons in a cup, 19 bears in a cup, 19 beans in a cup, 19 counters in a cup, etc.)
  Teacher's note: to stay focused on creating a group of ten ones and not create a ten avoid using connecting manipulatives like snap cubes. See Unpacking Document p.13
- Piece of string long enough to encircle ten of your selected objects

Advance Preparation:

- Prepare a list of possible student pairings.
- Gather materials listed above for modeling and practice.

Thinking Preparation:

- Review standards for mathematical practice and select those that you will focus on during this lesson. (http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/)
- Review the critical areas for kindergarten to connect this lesson with key mathematical ideas. (http://www.corestandards.org/the-standards/mathematics/kindergarten/introduction/) Critical Area 1: representing, relating, and operating on whole numbers, initially with sets of objects. (Unpacking Document p.5)

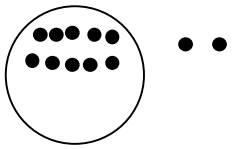
Previous Lessons:

- Students are familiar with building teen numbers using ten frames to create a group of ten ones and some extra ones.
- Students can count with one-to-one correspondence.
- Students can identify how many are in a group of ten and how many extra ones they have when composing a teen number.

Directions:

1. Gather students on the carpet
2. Present students with the following situation: I am going to give you a bag of objects. You need to determine how many objects are inside the bag and at least two ways to find how many.
3. Pass out one bag of objects per pair. Have students return to work spaces and proceed to count the objects using at least two strategies.
    - Teacher should be looking for students to create a group of ten ones and some extra ones based on exposure from previous ten frame lessons. While monitoring look for students who can model this strategy for sharing.
    - Students can also count by ones or use other counting strategies.
4. When two to three minutes have passed, have students leave their materials at their work spaces and return to the carpet.
5. Select students to model/explain how they counted their group of objects. Modeling can be done on board/SMART board/overhead/in the middle of the group with objects, etc.
6. After a few students share, ask the listening students to restate what strategies were used.
7. Tell students that you have a new strategy to show them. This strategy will involve "ringing" the group of ten as you make a teen number.
8. Take a bag of objects. Tell students that in order to figure out how many objects are in the bag you are going to make a group of ten ones and a group with the extra ones.
    - Make a ring with the yarn.
    - Model counting out ten ones and placing it inside the "ring" of yarn. Review that this is a group of ten ones (Can model how to arrange manipulatives into grouping similar to a ten frame).
    - Place any extra ones outside the ring of yarn.
    - Have students count how many are in the ring, how many are outside the ring, and how many there are all together.

9. Give each pair a piece of the yarn. Have students return to their previous work spaces/materials in two to three minutes reorganize their manipulatives using the new "ringing" strategy.
10. After the quick practice, have students clean up materials and return to carpet.
11. Tell students that they will play the "ringing" game with their partner.
    First model: teacher and a student partner; Second model: two students, repeat if needed.
    - Step 1. Partner 1 takes two (one-handed) handfuls out of the cup of manipulatives and places them in front of Partner 2.
    - Step 2. Partner 2 then uses the yarn to organize/ring the manipulatives into a group of ten ones and some extra ones.
    - Step 3. Partner 1 then rechecks Partner 2's work and answer.
    - Step 4. Partner 1 returns manipulatives to the cup and passes the cup to Partner 2.
    - Step 5. Students switch roles and continue.



12. Give each pair a piece of yarn and a cup of manipulatives. Students return to work space and place the ringing game for seven to ten minutes.
    a. Teacher note: While students are playing the game, the teacher is circulating and making note of students' abilities and strategies.
    b. While observing, identify pairs who can share when the class is brought back together. Decide the order for pairs to share with the group based on use of strategies.
13. Students clean up materials and return to the carpet. Have preselected pairs share how they counted and organized their group of manipulatives.

Questions to Pose:

Before: (with the initial bag task)

- When counting a group of objects what strategies can I use?

During: (with the ringing game)

- Explain how many (beans, bears, etc.) are in your ring?
- Explain why there are (beans, etc.) outside your ring
- How does ringing the group of ten ones help us find the total?

After:

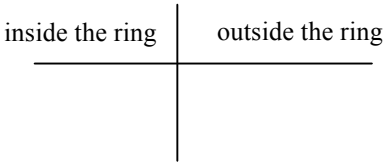
- Explain your procedure for counting your group of objects.

Possible Misconceptions/Suggestions:

Possible Misconceptions	Suggestions
If students place more than ten objects inside the ring	• Return to the use of a ten frame to continue practicing organizing a group of ten ones to confirm an understanding of the quantity of the collection. • On an individual basis revisit the importance of identifying groups of ten ones while counting larger sets of objects—practice with student as needed
When students do not include all objects that are outside the ring in their count. (example: There are four ones outside the ring. Teacher asks, "How many are outside the ring?" Student replies two.)	• Help students to group manipulatives outside of the ring together to encourage students to count all manipulatives outside of the ring.

Special Notes:

- This task may require multiple exposures in order to facilitate complete understanding.
- Use this lesson after students have had experiences with grouping teen numbers using a ten frame to show teen numbers as ten ones and some extra ones.
- Extension: repeat lesson and have students record their findings on a T-chart. Label one side of the chart as "Inside the ring" and label the other side as "Outside the ring". In either whole group or in pairs, students then write the corresponding numeral.



Solutions:

Students should be able to identify teen numbers as a group of ten ones and some extra ones.

Connecting Plane and Solid Figures

Common Core Standard:

Analyze, compare, create, and compose shapes.

K.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

Additional/Supporting Standard(s):

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

K.G.2 Correctly name shapes regardless of their orientations or overall size.

K.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Standards for Mathematical Practice:

3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.

Student Outcomes:

- I understand that plane figures are different from solid figures.
- I can identify and locate the face of a solid figure that matches a plane figure, such as the face of a cube is a square, the base of a triangular based pyramid is a triangle.
- I can name and select a shape when someone describes it with appropriate mathematical vocabulary.

Materials:

- A collection of plane shapes including squares, triangles, circles, and hexagons for each group of students.
- A set of solid geometric figures including cubes, spheres, rectangular prisms, triangular prisms, hexagonal prisms, cones, and cylinders.

Advance Preparation:

- Review the second critical area for Kindergarten entitled: Describing shapes and space
- Review the Kindergarten Geometry Domain to identify the specific components addressed in this task.
- Collect a set of plane shapes including squares, triangles, rectangles, circles, and hexagons for each group of students.
- Collect a set of solid geometric figures including cubes, spheres, rectangular prisms, triangular prisms, hexagonal prisms, cones, and cylinders.
- Create a list of students to work in each group (3-4 students). Remember to include a mix of abilities so that students may support each other in learning the properties and relationships
- Recall previous tasks that support the knowledge developed and used in this task so that you can review these with the students. Develop some assessment questions to determine what students remember about the concepts of the previous related lessons.

- Explore the shapes to see how students might name and relate the plane and solid figures. This will help you pre-think misconceptions and ways to remediate them.
- Create sentence or paper strips with the vocabulary you will use to facilitate students' learning such as square, rectangle, triangle, circle, hexagon, sphere, prism, cone, and cylinder. (I wonder…do we need an object or picture accompanying the vocabulary strip? Should they have the properties on cards as well so they are able to record their thinking in their math notebook later?)

Directions:

1. Organize the students into small groups of 3-4 students.
2. Permit students to explore the plane shapes while naming the properties, sorting, and comparing them. This will serve as a review for some students and learning opportunity for others. See the questions below to ask during exploration?
3. Following an appropriate exploration time with the plane shapes, distribute the solid figures and have students compare the plane shapes and solid figures to locate faces of the solids that match the plane shapes. See the questions below to ask during exploration?
4. Reference the vocabulary words on the paper strips to connect reading with the appropriate mathematical words
5. After an appropriate exploration time discuss the findings of students. You may wish to do this with small groups or with the whole group depending upon their level of development.
6. Reference the vocabulary words on the paper strips to connect reading with the appropriate mathematical words.
7. Have students get their math journals and create a list of two words they used on a blank page and to draw a picture of the shape and/or figure beside the word. This will allow you to determine who perceives the solid figures as different from the plane shapes.

Questions to Pose:

Before:

(These questions will provide an assessment of the mathematical understandings and appropriate vocabulary students currently have. Knowing this will help you know where you need to begin with each student, how to regroup students, and what questions will extend their knowledge.)

- Tell me where you have seen this shape before. (Some students will describe environments other than the classroom. Other students will need to visually check for the location of the shapes within their present environment.)
- Look around the room and tell me where you see the shape that you are holding. (This reveals if the student understands the incorporation of plane shapes in solid figures in the environment.)
- Display a shape and have students describe it using the properties that define it such as lines, angles, equal sides, unequal side, or number of sides.

During:

- How did you determine the name of the shape? (Student responses may vary based upon their knowledge of properties, understanding of vocabulary to describe properties, and experience with geometric shapes and figures.)
- When you compare the plane shapes with the solid figures what did you notice? (Some students will talk about the plane shapes that are components of the solid figures. Others will speak about the the shape and a familiar objects. You may want to review the van Heile levels of geometric reasoning at http://images.rbs.org/cognitive/van_hiele.shtml.

After:

- Explain to me the ways in which the shapes are alike. (Check for understanding of properties and use of appropriate vocabulary.)
- Explain to me the ways in which the shapes are different. (Check for understanding of properties and use of appropriate vocabulary.)
- Tell me what you learned from working with the plane shapes. (You may wish to document what you learn from the students and use it to plan the next lesson.)
- Tell me what you learned from working with the solid figures. (You may wish to document what you learn from the students and use it to plan the next lesson.)
- (Maybe…Loop back to before questions for ELL: Describe the properties of one plane shape you explored? Describe the properties of one solid figure you explored?)

Possible Misconceptions/Suggestions:

Possible Misconceptions	**Suggestions**
Students may not know the appropriate mathematical vocabulary for describing plane shapes.	As you move among groups, indicate the portion of the shape as you reference the vocabulary and provide the words written on small strips of paper (index cards work well) for each group and have students label the properties and names of shapes. Students may also need to draw and label properties in the math journals for reference.
Students may refer to shapes and figures as "it looks like a box, door, ice cream cone, a ball, etc."	This indicates that students are working at the beginning level of van Heile, visualization. (http://images.rbs.org/cognitive/van_hiele.shtml) Your goal is to move students' understanding to at least the second level, analysis. At this level student can focus on properties and use that knowledge to describe shapes and figures.
Students may confuse the difference between angle and vertex.	It is not required for Kindergarten students to understand the difference between and angle and a vertex. However, it is essential for the teacher to know in order to use the appropriate vocabulary when describing them. Through repeated use of the appropriate terms students will experience and learn to name the difference. A vertex typically means a corner or a common point where lines meet. An angle is a shape, formed by two lines or rays diverging from a common point (the **vertex**).

Special Notes:

This task should be repeated multiple times until students recognize, name and use the properties in describing shapes and figures.

The early levels of the van Heile model of geometric thinking do not always naturally develop for students. They need multiple, appropriate experiences with objects for this development to occur.

Level 1: Visualization

Students can name and recognize shapes by their appearance, but cannot specifically identify properties of shapes. Although they may be able to recognize characteristics, they do not use them for recognition and sorting.

Suggestions for instruction using visualization:

- Sorting, identifying, and describing shapes
- Manipulating physical models
- Seeing different sizes and orientations of the same shape as to distinguish characteristics of a shape and the features that are not relevant
- Building, drawing, making, putting together, and taking apart shapes.

2. Analysis

Students begin to identify properties of shapes and learn to use appropriate vocabulary related to properties, but do not make connections between different shapes and their properties. Irrelevant features, such as size or orientation, become less important, as students are able to focus on all shapes within a class. They are able to think about what properties make a rectangle. Students at this level are able to begin to talk about the relationship between shapes and their properties.

Suggestions for instruction using analysis

- shifting from simple identification to properties, by using concrete or virtual models to define, measure, observe, and change properties
- using models and/or technology to focus on defining properties, making property lists, and discussing sufficient conditions to define a shape
- doing problem solving, including tasks in which properties of shapes are important components
- classifying using properties of shapes.

An extension is to create paper strips with pictures of the shapes and figures to correspond with the names written in English and Spanish to help students associate the two and to learn to use them appropriately. You could substitute the use of the paper strips mentioned above with the pictures and names on them and repeat this same task to help student extend and clarify their understanding of the names and properties of the shapes and figures.

Posting the mathematical vocabulary on a word wall will allow you and the students to reference them as you work and write.

Solutions:

The focus of this task is to have students experience, learn and use the properties of plane shapes and solid figures. The objective is not to have a "right" answer but a level of understanding that prepares them for future work in geometry.

Creating and Describing Shapes

Common Core Standard:

Analyze, compare, create, and compose shapes.

K.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

Additional/Supporting Standards:

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

K.G.2 Correctly name shapes regardless of their orientations or overall size

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

Student Outcomes:

- I understand the name and type of a shape identified by the leader.
- I can create the shape named by the leader on my geoboard.
- I can use mathematical words to describe my shape to a partner with enough details for them to recreate it accurately.

Materials:

- Geoboards and Geobands for each student
- Mathematical vocabulary, one word per sentence or paper strip such as sides, vertices/angles, sides of equal length, sides of unequal length.

Advance Preparation:

1. Assemble one geoboard with five geobands strung on it for each student.
2. Review the description of the Standards for Mathematical Practice that are addressed in this activity and Standard and Clusters in the Geometry Domain.
3. Select the mathematical vocabulary that will be the focus of this activity. Create sentence strips with one word on each of them so that students can connect the written word with the spoken word.
4. Prepare a list of names for working pairs of students.
5. Generate a list of "rules" you think are important for working with geoboards and geobands and appropriate consequences.

Directions for Activity:

1. Organize students in pairs.
2. Distribute prepared geoboards
3. Ask students to generate a list of "rules" for working with Geoboards (such as leave your geoboard on the table until directed to use it. Exercise great care in placing geobands so as not to hurt yourself or someone else by releasing them before they are placed on pegs. Have students suggest consequences for using the tools inappropriately.)
4. Have students to model how to create a shape with geobands. You may wish to use electronic geoboards on the web: http://www.mathplayground.com/geoboard.html
5. Have several students describe the shape created. If necessary remind students of vocabulary that enables them to focus on the mathematical properties of the shape, such as sides, vertices/angles, length, width, etc.
6. Give directions for working as partners, such as taking turns so that one partner makes a shape and gives a description for creating it as the other partner creates the shape from the description. Compare the shapes by looking at both simultaneously. Then switch roles. Complete at least three different shapes per partner.
7. Reconvene as a class and have several students share their shapes by naming and describing them. (You might allow students to practice describing with a different partner and then describe for the whole group.)
8. Refer to the shapes created and the vocabulary used to describe them.

Questions to Pose:

- Describe the shape on your geoboard using the "special" mathematical vocabulary we discussed.
- How do you know that the shape is a (square, circle, triangle, rectangle, hexagon)?
- What words did you use to help your partner know which shape to create?
- Where do you find the shape that you created in our classroom, at home, on the playground or at the grocery store?
- If the shape your partner created is different from yours, describe the ways the shapes are alike? Describe the ways in which the shapes are different?

Possible Misconceptions/Suggestions:

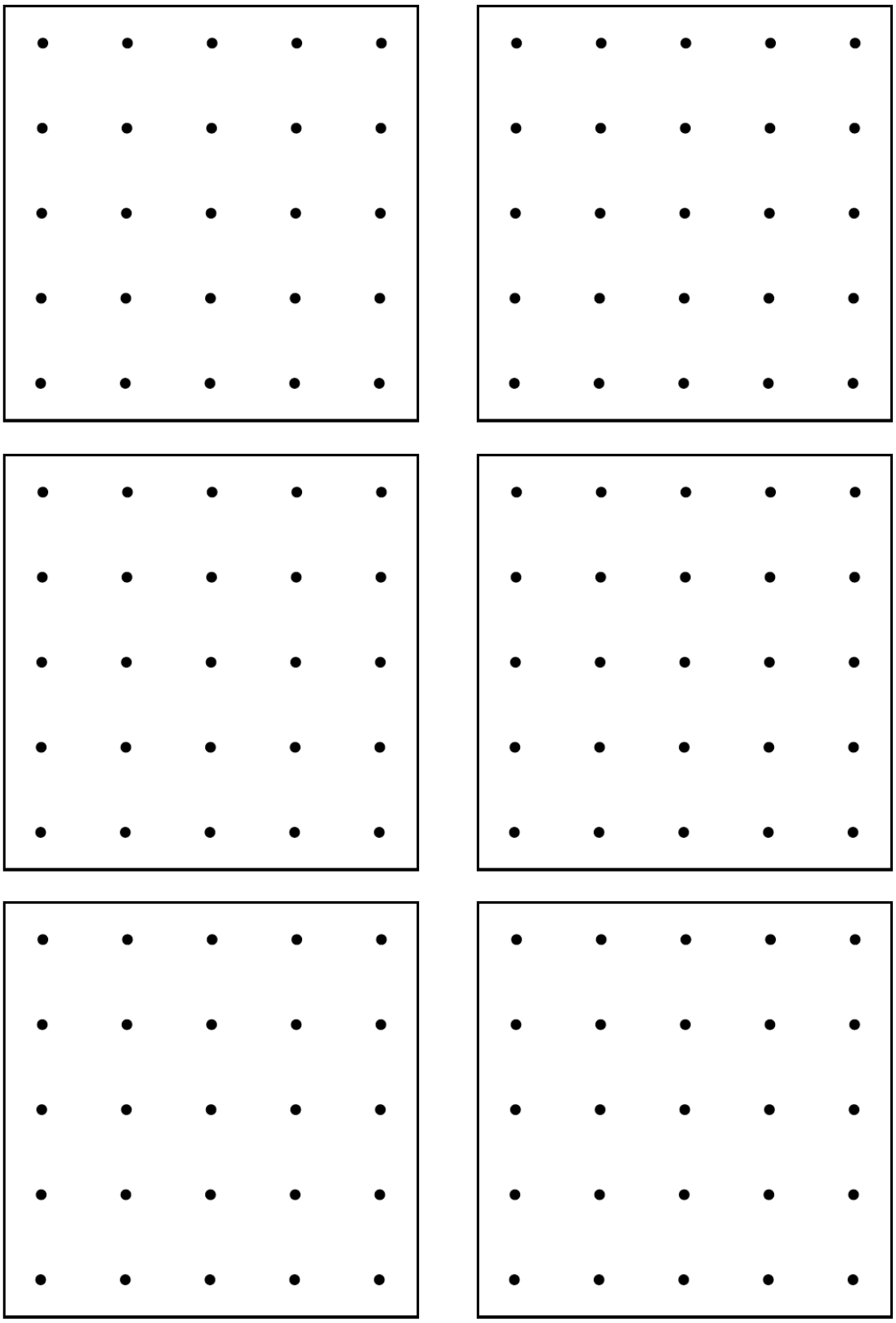
Possible Misconceptions	Suggestions
Students may not recognize triangles that are not equilateral triangles.	Model a variety of triangles such as, right triangles, acute triangles, obtuse triangles, scalene triangles, isosceles triangles.
Students may not recognize shapes in orientations when the base is not parallel with the side of the geoboard.	Show students plane figures resting in different orientations. During your modeling of shapes includes those shapes in various orientations on the geoboard.
When squares appear resting on a vertex, students may confuse them with a rhombus and/or call it a diamond.	Show students a square (maybe a pattern block) resting on a side and on a vertex. Then show students a rhombus resting on a side and a vertex. Discuss the appearances in each orientation. Emphasize the fact that the shape does not change shape because of the orientation.

Special Notes:

Make certain to use various types of triangles and orient shapes in multiple ways.
Encourage the use of appropriate mathematical vocabulary and connect it with reading goals.

Extension: You might wish for students to record on the geodot paper blackline master the shapes they make on the geoboard. (Save these recording for the student's portfolio as evidence of their learning.)

Solutions: N/A



Making "Bigger" Shapes with Smaller Shapes

Common Core Standard:

Analyze, compare, create, and compose shapes.

K.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

Additional/Supporting Standard(s):

Describe and compare measureable attributes.

K.MD.2 Directly compare two objects with a measure attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

a. When counting objects, say the number 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.
b. 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.
c. Understand that each successive number name refers to a quantity that is one larger.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision

Student Outcomes:

- I can compose a congruent hexagon using smaller pattern block pieces.
- I can explain which different arrangements of smaller pattern block pieces compose a congruent hexagon.
- I can count, in the correct sequence, the number of smaller pieces that compose a "bigger" shape
- I understand that the last number I count is the cardinal number (The last number identifies the quantity of the collection and includes all the numbers that come before it.)
- I can compose the different congruent hexagons I made by gluing paper pattern blocks onto a separate sheet of paper.

Materials:

- Bags of pattern blocks per student including 2 hexagons, 16 triangles, 6 rhombus, 4 trapezoids
- A large collection of paper pattern blocks for recording the different congruent hexagons composed
- Glue sticks
- Blank sheets of paper
- Crayons to match the colors of the pattern blocks
- Trapezoidal grid paper

Advance Preparation:

- Review the 2nd Critical Area for Kindergarten: Describing Shapes and Space to identify the important mathematical ideas related to this lesson.
- Review the Geometry, Measurement and Counting and Cardinality Domains to see the connections among the ideas
- Use the collection of pattern blocks to create as many congruent hexagonal shapes as possible
- Prepare the bags of pattern blocks for each student including 2 hexagons, 16 triangles, 6 rhombus (rhombi is the plural of rhombus), 4 trapezoids
- Prepare paper pattern blocks or provide a copy of the triangular grid paper included in this lesson. (This is a wonderful opportunity for a parent volunteer to cut them using a die-cut or cutting with scissors from the attached blackline masters.)
- Gather glue sticks and blank paper.
- Prepare paper strips with the mathematical vocabulary words you will use and want students to learn, such as triangle, rhombus, trapezoid, hexagon, congruent, equal to, same shape as, pattern blocks

Directions:

1. Distribute the pattern blocks to each student and ask them to find their work space.
2. Allow time for students to explore how the pattern blocks "fit" together.
3. Move among the students asking questions about their shapes, the names of pieces they used to create the shape, and how they would describe it to a friend.
4. When students have had adequate time for exploration (The amount of time required will vary based upon their previous experiences with pattern blocks.)
5. Reconvene the class as a whole group. Show a shape and ask students if they know the name of the shape. Repeat this with the shapes you will use in the task: hexagons, trapezoids, rhombi, and triangles. As you present a shape, show the corresponding paper strip with the word printed on it. (This helps students connect the spoken and written mathematical vocabulary. After the lesson you may want to post these vocabulary strips on your word wall.)
6. Ask the students to describe different ways to make a shape congruent with the hexagon. You may need to model this for students and explain the meaning of congruent. (Two objects are congruent if they have the same dimensions and shape. Two figures are congruent if they are identical in form; coinciding exactly when superimposed.)
7. Assign pairs of students to work together using one bag of pattern blocks between them.
8. Once students have found all of the possible ways to make a shape congruent with a hexagon, reconvene the class as a whole group.
9. Ask the groups to leave their creations and reconvene as a whole class. Invite students to use your set of pattern blocks to create and describe the different compositions of congruent hexagons.
10. Reference any other math vocabulary that connects with this lesson and engage and invite students in reading them with you.

Questions to Pose:

Before:

- Tell me what you know about pattern blocks. (This helps you understand the students' prior knowledge about pattern blocks. It will also give you an understanding of the mathematical vocabulary.)
- Tell me the names of each shape as you hold it up or present it on the smart board. (You might also want to make large paper shapes to make it easier for students to see them.) This information will be useful in asking questions of students as they work as individuals and pairs.
- What kinds of things do you want to do with the pattern blocks?

During:

- Tell me what you have learned about pattern blocks. (You may want to document what students share with you so that you can plan the next question(s) and/or lesson.)
- What discoveries have you made about pattern blocks? (You might expect students to tell you that two triangles make a rhombus, one triangle and one rhombus are equal to a trapezoid, six triangles are equal to one hexagon, etc.) At this time you might introduce the word and meaning of congruency. (Two objects are congruent if they have the same dimensions and shape. Two figures are congruent if they are identical in form; coinciding exactly when superimposed.)
- Which of the shapes do you know the "math" word that describes it?

After:

- Tell me what you have learned when worked with the pattern blocks. (You may want to document what students share with you so that you can plan the next question(s) and/or lesson.)
- What discoveries have you made about pattern blocks? (You might expect students to tell you that two triangles make a rhombus, one triangle and one rhombus are equal to a trapezoid, six triangles are equal to one hexagon, etc.) At this time you might introduce the word and meaning of congruency. (Two objects are congruent if they have the same dimensions and shape. Two figures are congruent if they are identical in form; coinciding exactly when superimposed.)
- Which of the shapes do you know the "math" word that describes it? (You may want to document what students share with you so that you can plan the next question(s) and/or lesson.)
- Tell me things you learned while making shapes congruent with the hexagon? (You may want to document what students share with you so that you can plan the next question(s) and/or lesson.)
- Describe for me the shapes that are equal to other shapes. (You may want to document what students share with you so that you can plan the next question(s) and/or lesson.)

Possible Misconceptions/Suggestions:

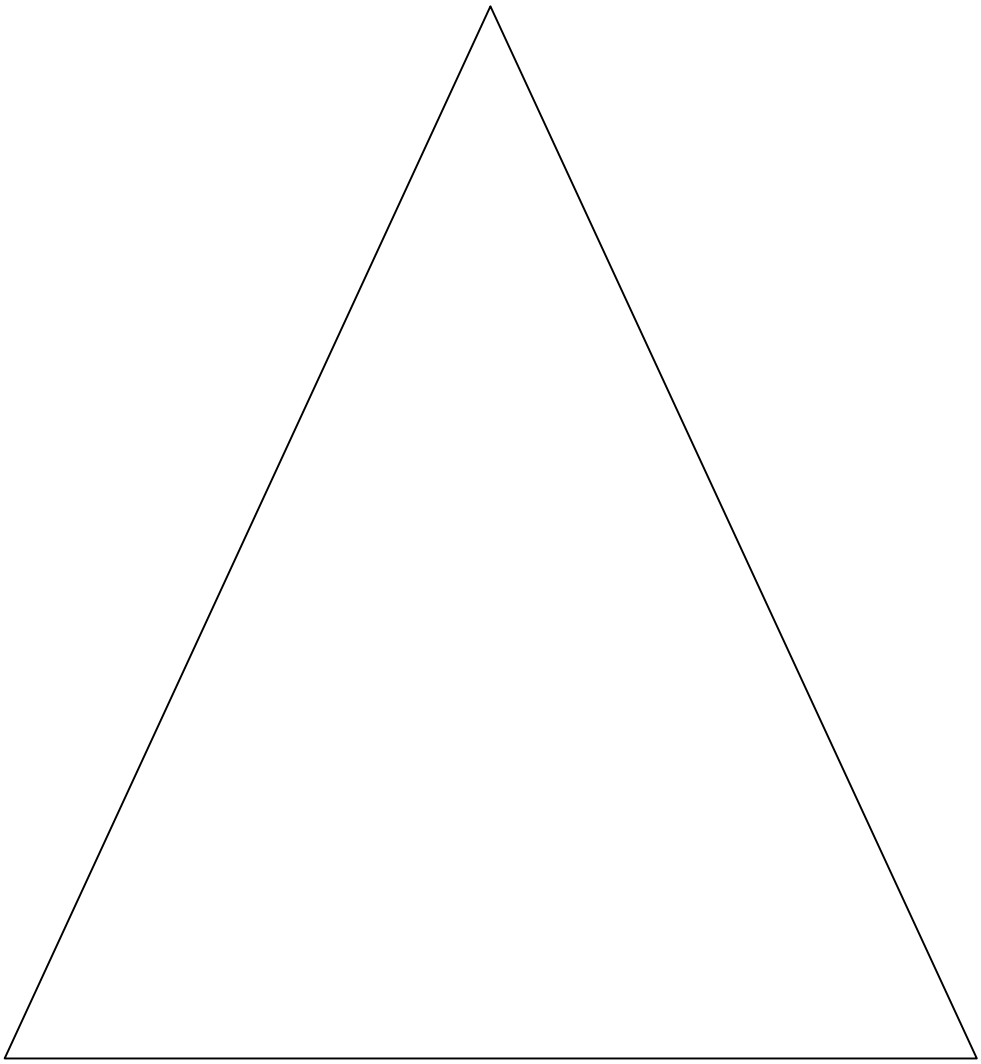
Possible Misconceptions	Suggestions
Students may not know the proper mathematical word to label the pattern blocks.	Use the appropriate mathematical vocabulary when showing and talking about each of the shapes. Associate the written words with the spoken words. Invite students to use a few of the words in their activities.
Students may have difficulty manipulating the shapes.	You might create some outlines of the shapes on paper and laminate or place them in page protectors. Give these to students as a "pattern" for composing congruent shapes.
Students are not likely to know the meaning of congruent.	Use this word in the context of creating congruent shapes as 2 triangles to form a rhombus, 3 rhombi to form a hexagon. Have different students to repeat after you the appropriate use of the word and to describe what it means. (Two objects are congruent if they have the same dimensions and shape. Two figures are congruent if they are identical in form; coinciding exactly when superimposed.)

Special Notes:

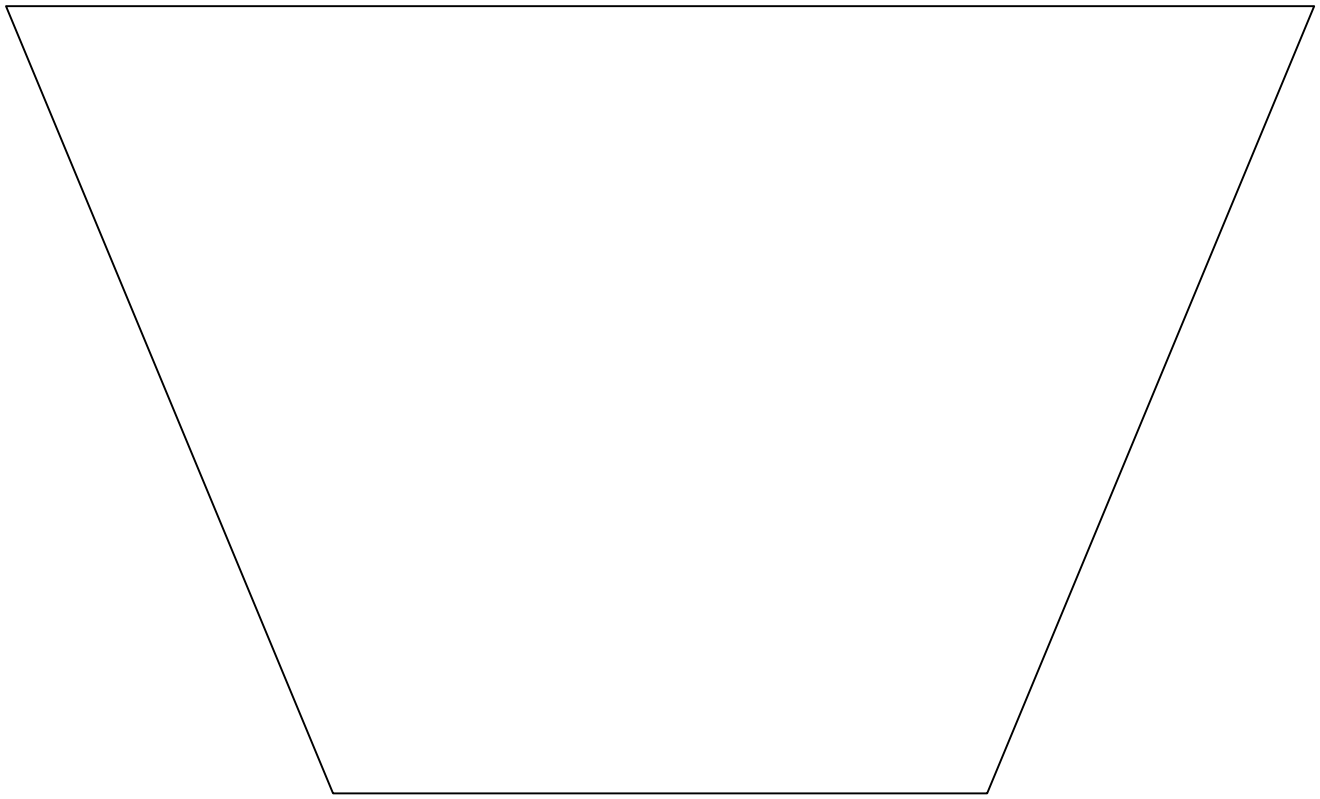
This activity merits repeating multiple times so that students will truly understand the shapes that are congruent and can name and describe those that are.

Solutions: N/A

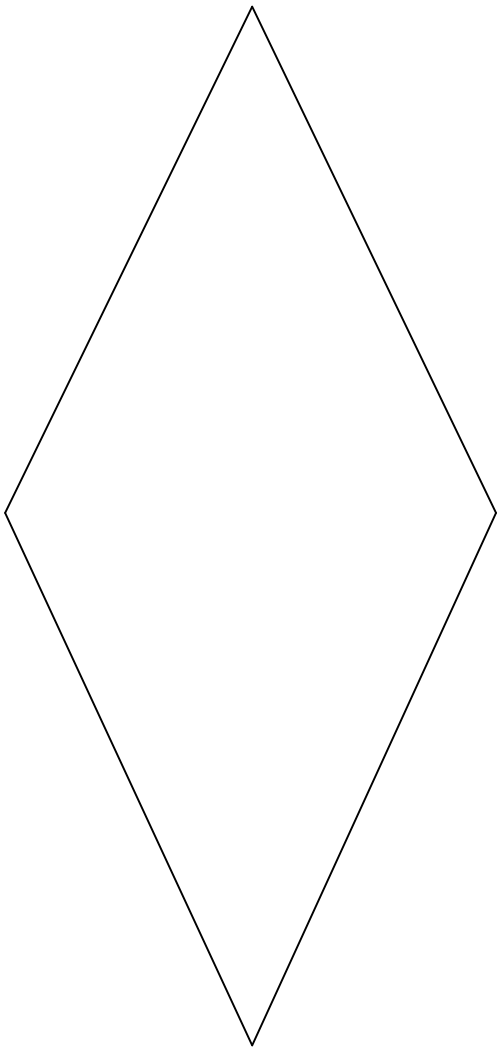
Large Triangle to Reproduce for Demonstration



Large Trapezoid to Reproduce for Demonstration



Large Rhombus to Reproduce for Demonstration



Large Hexagon to Reproduce for Demonstration