Unit: Number Combinations: Addition<br>Mathematics Unit Plan<br>Ashley Carroll

EDUC 545<br>Modern Mathematics Methods for Elementary School<br>Jason Rubeling, Instructor<br>Hood College<br>August 6, 2012

## Unit Plan: It All Adds Up: Number Combinations in Kindergarten


#### Abstract

: This unit plan provides a five day plan for teaching and developing the concept of addition with kindergarten students. The unit begins with a pre-assessment to determine what students already know about addition and their current level of understanding (concrete, pictorial or abstract stage in development). Following the pre-assessment, each day builds upon the prior day. The lessons begin with building the concept of addition using tens frames, manipulatives and then moves into using pictures and basic number sentences to model addition. The final two days of the unit assist students in making real world connections and consider how addition is used in everyday life. On day four of the lesson, the students explore real world pictures, identify where/how they see addition in pictures, orally create addition stories and then work as a class to draft their own story problems. Finally, day five engages students in a problem based learning experience where they must apply all the strategies they have learned about for solving addition problems. The lesson progression of the unit works on building from the concrete to the abstract and finally, to real world application.


Unit Plan Overview:
Grade Level: Kindergarten
Duration: 5 Day Unit (plan designed for a 60 minute math block)

Enduring Understanding: Problem solvers preserve, use their tools, chat with others, defend their thinking and use strategies to solve problems.

Focus Question: What happens when numbers are put together?

Higher Order Question: How did you behave like a problem solver today?

Common Core Connections:
KOA. 1
KOA. 2
KOA. 3
Standards for Mathematical Practices
Standard 1: Make sense of problems and preserve through solving them: Students will have several opportunities throughout this unit to explore the concept of addition and apply it to a real world challenge during a problem based lesson.

Standard 4: Model with Mathematics: Students are asked to use what they have learned about addition on day 4 and 5 of this unit to solve a real world problem using various strategies including manipulatives, pictures and basic addition sentences.

Standard 5: Use tools appropriately and strategically: During this unit students are able to explore various math tools and how they can be used to solve problems.

Standard 6: Attend to Precision: Students are asked to communicate their understanding of problems, how they used strategies and solved a real problem using appropriate vocabulary related to addition and problem solving.

Standard 7: Look for and make use of structure: On day 4 and 5, students are asked to use what they have learned about addition and identify when addition would be used in real world situations and identify when/how addition is being used in various contexts.

Lesson 1 Day 1: Exploring Addition(Pre-Assessment)
Focus Question: What happens when we put numbers together?
CCSS connections:
KOA.1, KOA. 3
Standards for Mathematical Practice:
Standard 1 and Standard 5
Pre-Assessment:
Whole Group:


1. Gather students in the whole group meeting area.
2. Pose this simple problem: There were 5 kids in line for the slide. 3 more kids got in the line. How many kids are waiting for the slide altogether?
3. Chorally read the problem with the students. Ask the students: "How would you solve this problem?
4. Allow students to choose their own tools, which may include: whiteboards, manipulatives, paper/crayons, and number line... any available tool in the classroom that is for their use.
5. The teacher's role is to informally assess students as they work independently. The teacher should use an anecdotal checklist to capture student strategies and their level of understanding of addition. The teacher should consider:
a. Does the student combine the two smaller groups? Does the student count all, count on?
b. How does the student represent the problem? Concretely, pictorially, or abstractly?
c. How does the student explain their process? Can the student identify how two smaller parts make a larger whole?
6. Students should be given the opportunity to share their ideas and strategies with the class as the teacher continues to informally assess... how does the student explain their process and explain their thinking? Can the student determine if the answer is reasonable and explain how they arrived at the answer?
7. The assessment information will be used for the remainder of the lesson to provide differentiated instruction based on where the students current level of understanding is with the concept of addition.

Assessment: Informal observation and anecdotal checklis $\dagger$
Look Fors...
a. Does the student combine the two smaller groups? Does the student count all, count on?
b. How does the student represent the problem? Concretely, pictorially, or abstractly?
c. How does the student explain their process? Can the student identify how two smaller parts make a larger whole?
d. How does the student explain their process and explain their thinking?
e. Can the student determine if the answer is reasonable and how they arrived at the answer?

Focus Question: What happens when we put numbers together?
CCSS connections:
KOA.1,KOA. 3
Standards for Mathematical Practice:
Standard 1 and Standard 5

Materials:
Mathstrart: Animals on Board


Tens Frames Trains and Spinners


Double Dice (dots) and single dot dice


Double tens frame Mats with Chips


Animal Necklaces
Painters Tape
Large paper for process chart
Subitising dot cards to five
Exit tickets \# 123 (see attached samples)

Lesson Events: Lesson Focus: Using Tens frames and manipulatives
Whole Group: 10 minutes

1. Read aloud: Mathstart: Animals on Board: Question for student to consider: what happens to the animals? This book could also be scanned into a PowerPoint presentation to be more interactive for the students.
2. Human Tens Frame Activity: Using some of the animals from the book, students will select an animal they would like to be during the activity. Animal necklaces will be worn by students. A large tens frame will have been created on the floor a head of time using painters tape.
3. The teacher will model by giving an oral story problem. An example may include "there were 3 zebras on the train and 5 lions joined. How many animals are on the train altogether?
4. Guiding questions: How can we use the tens frame to help us solve this problem? Is there another way we could show how to solve this problem (students may suggest a picture or a number sentence, allow a student/s to model for the whole group). How many more animals would we need to get 10 animals on the train? How do you know?
5. Continue with the same process above and then allow students to orally form problems.
6. Closure and Assessment: Process Chart: What happens when we put numbers together? Allow students to add any observations. Discuss important words they heard and the strategies that were used to solve (i.e. tens frames, etc.)

Small Groups and Differentiation: Groups will be determined using the information from the informal assessment on day 1. Any students, who struggled with the task, creating groups, counting altogether, will be given tasks rooted in number combinations to ten and there will be an emphasis on using concrete materials. Students who were able to show two groups and count altogether will begin with concrete; however, will move into using pictorial representations. Finally, students who used a variety of strategies, such as drawing a picture or writing a simple number sentence will work with larger number quantities and will be introduced to the addition sentence template early on.

Rotation 1(15 minutes): Basic: Small group with the teacher: Students will work with tens frames and dot cards to model number combinations to ten. Students will flip over one card, count dots (if needed... opportunity to work on subitising numbers as well) and model on tens frame. Another card is flipped, counted and added to the tens frame. As the students work, the teacher should also model the process along with the students, emphasizing the vocabulary "altogether, add, counting all."
Assessment: Students model on their own using two dot cards and then must explain the process to the group. The teacher may also ask students to explain how another student modeled their problem on their tens frame to check for understanding.
Students will then take their materials and work with a partner to continue the activity and practicing the process.
(Proficient and Advanced students work on previously taught skills at math stations during rotation 1)
Rotation 2(15 minutes): Proficient: Students will work with partner and play the "tens frame train" game. Students will start with 2 unifix cubes in their trains. A 6 sided dot dice is rolled and that many cubes will be added to the train. Students will be given a template to use with the game as well. The template can be used with a dry erase marker to be several times during the game. The template
says " $\qquad$ and $\qquad$ is the same as $\qquad$ ." Students will fill in their template and read it back to their partner as they play.
Assessment: As an exit ticket after their independent partner work time, students will select one example from their tens frame to draw on the ticket. They will represent the addition problem with pictures and complete the number sentence as well ( see attached sample of exit ticket).
(Basic students are working on partner game introduced during small group time and advanced remain at math station)

Rotation 3(15 minutes): Advanced: These students will use double dice and double tens frames. Students will roll the double dice and determine how many chips to put in the first tens frame. Students will roll a single dot die to determine how many chips to put in the second tens frame and then determine how many chips altogether. As a group, students will assist the teacher in writing a number sentence to match what is on the tens frame.
Assessment: Students will be asked to select one tens frame problem to represent in picture on a paper version of the double tens frame. Students will also complete the sentence " $\qquad$ and $\qquad$ is the same as $\qquad$ ."
(Proficient students work on partner work introduced during small group time and basic students work at math stations).

Final Wrap up and Closure: All students will bring their exit tickets to the rug for a final sharing. The teacher should refer back to the focus question to guide student thinking and discussion. The process chart can also be added to if students encountered other strategies for addition or other key words that they feel should be added.

## Math Station Connection/Extension:

The tens frame and animal necklaces, along with the other games introduced during small group work time will then be added to math stations for the students to work on over the course of the week.

Lesson 3 Day 3: Picturing Addition
Focus Question: What happens when we put numbers together? CCSS connections:
KOA. 1, KOA.3, KOA. 2

Standards for Mathematical Practice:
Standard 1, Standard 4, Standard 5 and Standard 7

Materials:
MathStart: Animals on Board
Whiteboards and Dry Erase markers (two colors)
Word problem from day one
Counters
3 compartment plastic plates Picture Addition game mats Exit tickets 45


Lesson Events: Lesson Focus: Using Tens frames and manipulatives
Whole Group: 30 minutes
Whole Group: 30 minutes

1. Review focus question and process chart thus far.
2. Using the Animals on Board book from yesterday: ask the students to consider this question: How did the author show addition in this book? What strategies can you see that the author used? Are these strategies the same as the ones we used yesterday? Why or why not?
a. Look Fors: students determine the author used pictures and number
b. The author used groups in the picture to show the numbers
c. Students notice the addition and equal sign with the numbers
d. Students notice that yesterday they used objects and the author did not however, they did use pictures and numbers at the end of the lesson on the exit ticket.
3. Revisit problem from day one. How could we use the same strategy the author did to solve this addition problem? Students use their whiteboards and dry erase makers to show a picture. If students finish early... ask them to consider: "Is there another way you could show your answer?"
a. Assessment: The teacher should use the attached "Purposeful Mathematical Conversations" checklist to assess students as they solve. The teacher should be looking for which students will share and consider the sequence for sharing.
4. Students place their whiteboard at their seats. The class will perform a gallery walk to look at student strategies and then meet back on the rug. At this time, the teacher will use the checklist to ask the selected students to share their work. The teacher should encourage students to consider if the strategy was effective or made sense and explain why. Additionally, students should be asked to explain another student's strategy in their own words during the sharing process.

Small Group/ Differentiation/ Guided Practice: The teacher should review assessments from days 1 and 2 to make any needed flexible grouping changes to make sure all students needs are met.
(Basic and Proficient students are at Math Stations while teacher is briefly meeting with advanced students).
Advanced: These students will briefly meet with the teacher to receive their problem for their problem solving notebooks. Students will read the problem with the teacher and find the important math words. Students will then go to their seats to independently solve the problem using a strategy of their choice. Once students have completed their notebooks and explained their strategy to a partner, they will work the remainder of the period at a math station.
Assessment: Student Product: Problem solving notebook: What strategy did the student use to solve the problem? Where numbers included and how did the student explain their strategy? Technology Integration: If the teacher has access to a LiveScribe Pen and the students have been introduced to this tool, one student can solve the problem in the interactive notebook for additional assessment.
(20 minutes for basic and proficient groups)
Basic: In a small group with a teacher students will use an addition model (this uses a 3 divided plastic plate) and dot cards 1 to 5 (for number combinations to 10 ). The teacher will model how to use the model with students and then students will work in partners at the table with the teacher. One partner turns over a dot card and models that number in the first section. The next partner repeats this process and models in the second section. All manipulatives are then moved to the "altogether" section at the bottom. Students then use a dry erase maker to fill in their template:
"_ and $\qquad$ is the same as $\qquad$ ."
Guided Practice and Assessment: Students will then continue to play the game with partners. They will have an exit ticket(\#5) to complete that looks like the model they have been using (see attached sample) to draw one of the problems they worked on. They will bring this to the carpet to share. Once they have played the game for an additional 10 minutes, students may then go to a math station.

## Proficient:

Using the picture template (sample included) students will use number dice to create sums to 12. The teacher will model as the students use their own boards. 1 dice is rolled, that amount is drawn in one color (such as green) using a dry erase marker. The next dice is rolled and the number drawn in a second color (such as black). Students then count how many dots they have altogether and complete the sentence at the bottom __ and ___ is the same as__. Students must then use their whiteboards to show another way they could draw a picture to solve the problem.
Guided Practice and Assessment: Students take their game and continue to play with their partner. They must complete the exit ticket \#4 (see attached) before the cleanup bell and bring to the carpet to share.
Final Wrap up and Sharing: Students bring their exit tickets to the carpet to share with the whole group. The teacher should ask 1 student from each group to share. Students in the audience will consider this question:" Do all of these strategies show addition? How do you know? What have we learned about addition that can be added to our process chart?"
Math Station Connection/Extension: The games introduced during small group work time will then be added to math stations for the students to work on over the course of the week. The book Animals on Board can also be added to a center along with blank books where students can make their own addition books using the book as a model.

Focus Question: What happens when we put numbers together?
CCSS connections:
KOA.1,KOA.3, KOA. 2

Standards for Mathematical Practice:
Standard 1, Standard 4, Standard 5 and Standard 7

## Materials:

Technology: Promethean board: Flipchart: Joining stories
Whiteboards and Dry Erase markers
PowerPoint: What's the Story?
Large Blank white paper, pencils and crayons
Manipulatives and tens frame available to students

## Lesson Events

## Whole Group:

1. Warm-up: Joining Stories Flip Chart: students manipulate pictures to solve addition problems (sums to 10). Students will also have their whiteboards and will be asked if there is another way they could show the problem given.
2. PowerPoint presentation: How do we use addition in the real world? Where do we see addition in our world? Students will look at a series of slides with real photographs of examples when addition may be used in the real world. Students will orally create the story the story that goes with the picture. (For example, if the picture shows 5 dogs playing in a park... The student might stay... 3 dogs were playing in the part, 2 more joined them. How many dogs are playing in the park altogether?) The teacher should model the addition stories for the first couple slides and then allow the students to take over the story telling. Students will discuss each photograph with a partner seating near them and then share their ideas/explanations with the whole group. (Math practices 1 and 7 are emphasized here).
a. Math Station connection: after this lesson, the slides of the PowerPoint could be printed out and students could practice making their own addition stories in their math journals.
3. After examining the pictures, crafting stories, and discussing how they see addition, students will then partner with another student to begin brainstorming how the class could write a real world addition problem.
4. As a shared writing, the students will assist the teacher in writing two different addition story. Through discussion and reference to the process chart, students will draft two different story problems as a whole class.
5. Half of the class of students will go to math stations, while half of the class remains with the teacher ( heterogeneous group). These students will draft an addition story as a group.
6. The groups will then switch and the other group of students will draft a different story problem.

Independent Practice:
7. Once the problems have been drafted, students will work in groups of two to solve the problem drafted by the other group. Each pair of students will solve the problem using two different strategies introduced earlier in the week (using manipulatives, tens frames, addition sentence, drawing a picture).
8. Differentiation: Purposeful partnering: Students will be partnered heterogeneously (basic/proficient partnered with advanced) to promote mathematical conversations and collaboration.
9. Students will be given a blank piece of paper. They will design how they want to show their thinking and both their strategies.
10. Mathematician Sharing Time: Share and compare strategies and students explain the strategies that other students used.

## Assessment:

Informal Assessment: Student conversation/vocabulary usage
Purposeful Mathematical Conversations Checklist will be used to observe student strategies and orchestrate purposeful sharing of strategies.

## Formal Assessment:

Student Product: The rubric below will be used to evaluate student products and contributions to group work time.

|  |  | I used some pictures and words <br> to show my thinking. |
| :--- | :--- | :--- |
| l used words and pictures to <br> show ALL my thinking. | I forgot to use pictures and <br> words to show my thinking. |  |
| I used the words more, less and <br> equal and numbers to show my <br> thinking. | I used some math words and <br> numbers to show my thinking. | I forgot to use math words to <br> show my thinking. |
| I checked ALL my work and <br> made sure it makes sense. | I checked some of my work to <br> make sure if made sense. | I forgot to check my work to <br> make sure it made sense. |
| I made sure my works shows my <br> thinking for ALL the questions. | My work shows some of my <br> thinking. | I forgot to make sure my work <br> shows my thinking for all the <br> questions. |
| I "shared the pencil" with my <br> partner all the time. | I shared the pencil some of the <br> time. | I had a hard time sharing the <br> pencil with my partner. |

After reviewing the student products, the teacher should use the information gained to provide the necessary scaffolding for students during the PBL lesson planned for tomorrow. Students who struggled with this task may need additional support from the teacher during the PBL lesson. This information may also be used to plan purposeful partnering for Lesson 5.

Lesson 5 Day 5: Making Real World Connections: Problem Based Learning (Post Assessment)
Focus Question: What happens when we put numbers together? CCSS connections:
KOA.1,KOA.3, KOA. 2

Standards for Mathematical Practice:
Standard 1, Standard 3, Standard 4, Standard 5 and Standard 7

## Materials:

Clipboards/blank paper/ pencils


Large Blank white paper, pencils and crayons
Manipulatives and tens frame available to students

## Lesson Events

Whole Group:

1. Introduce the problem to the students:
a. Funkstown School needs our help! All of the swings on the kindergarten and prekindergarten playgrounds need to be replaced because they are very old and not safe any longer. Mr. Rick (our custodian) needs us to figure out how many swings altogether will need to be replaced.
b. Turn and talk: How will you help Mr. Rick to know how many swings he needs to replace on both playgrounds? Students will discuss their strategies and plan of action.
c. Students will then go outside to examine the playground and decide how they solve the problem and determine their answers (students may take clipboards and pencils to help them record any important information)

Partner Work/Independent Practice

1. Students work in heterogeneous partners to solve the presented problem using a strategy of their choice.
2. Students will show how they got their answer and explain how they used the strategy they selected.
3. During work time, the teacher should use the attached assessment checklist for orchestrating mathematical conversations and sharing.
4. Students will participate in a gallery walk and then partners will share their work according to the order determined by the teacher during observation.
5. As a class, the students will then draft a "work order" to give to Mr. Rick to let him know what the discoveries were made and how many new swings he will need to order for the playground.

## Assessment:

Informal/Ongoing: Purposeful Mathematical Conversation checklist (see attached sample).

Questions: 1. Can you explain your thinking? 2. How can you show your thinking?
3. What have you discovered? How does that compare to the other partners at your table?
4. Is there another way you could show your thinking?

Formal Assessment: Student Product: Rubric used on Day 4

|  |  | I used some pictures and words <br> to show my thinking. |
| :--- | :--- | :--- |
| I used words and pictures to <br> show ALL my thinking. | I forgot to use pictures and <br> words to show my thinking. |  |
| I used the words more, less and <br> equal and numbers to show my <br> thinking. | I used some math words and <br> numbers to show my thinking. | I forgot to use math words to <br> show my thinking. |
| I checked ALL my work and <br> made sure it makes sense. | I checked some of my work to <br> make sure if made sense. | I forgot to check my work to <br> make sure it made sense. |
| I made sure my works shows my <br> thinking for ALL the questions. | My work shows some of my <br> thinking. | I forgot to make sure my work <br> shows my thinking for all the <br> questions. |
| I "shared the pencil" with my <br> partner all the time. | I shared the pencil some of the <br> time. | I had a hard time sharing the <br> pencil with my partner. |

## Future Lesson Focuses:

Upon the review of the post assessment, any students who need additional support with developing concepts related to addition will be provided with additional small focused group work.

All students will continue to work on addition word problems in their problem solving notebooks and begin to explore the different contexts in which an addition problems may be written. Students will explore and work through various addition problems (part to part to whole, joining, compare) to develop an awareness of the varying structures that exist. Students are able to use what they have learned about addition to begin to explore these structures within the context of word problems.

After the implementation of the above unit, future lessons may include the following objectives/focus areas:

1. Composing and decomposing numbers within ten: students will be able to use what they have learned about addition and number combinations to build their knowledge of representing a given number in multiple ways. (KNBT.1)
2. Understanding the concept of " 10 and some more": Students can use what they have learned about the number ten as anchor and what they have learned about addition to explore what happens to numbers when more is added to ten Students can also discover counting patterns related to adding to ten. (KNBT.1)
3. Begin to explore subtraction and how it relates to addition. (KOA.1, KOA.2)

Once students have explored the lessons planned with this unit, they will have explored the concept of addition through concrete, pictorial and abstract representations and they will already have a significant amount of background knowledge. They can apply what they have learned to decomposing numbers and number combinations within base ten. Using what they have learned about the structures of addition, students can then begin to explore and build an understanding of how subtraction relates to addition. Furthermore, the strategies taught within this unit ( using tens frames, manipulatives, pictures and number sentences) can all be transferred and applied when working on composing and decomposing numbers as well as exploring subtraction.

## Anecdotal Notes: Addition Unit

| Student | Observations | SMPs |
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Purposeful Mathematic Conversation Checklist

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| K.CC.4c Understand that each successive number name refers to a quantity that is one larger. |  | K.CC.4b Understand that the last number name said tells the number of objects is the same regardless of their arrangement or the order in which they are counted. (cardinality, conservation, and stable order) <br> K.CC.4c Understand that each successive number name refers to a quantity that is one larger. |  | K.MD.3b Count the number of objects in each category. Limit category count to be less than or equal to 10 . <br> K.MD.3c Sort the categories by count. Limit category counts to be less than or equal to 10 . |  | K.OA.2b Add and subtract within 10, e.g., by using objects or drawings to represent the problem. <br> 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.G.4b Analyze and compare 2dimensional shapes, in different sizes, and orientations, using informal language to describe their similarities, differences, parts (e.g., " of sides and corners), and other attributes (e.g. having sides of equal length). |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| K.CC.5a Count to answer "how many?" questions about as many as 10 things arranged in a line, a rectangular array, or a circle. |  | K.CC.5a Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle. |  | K.G.1.b. Describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to. |  | 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.G. 5 Model <br> shapes in the world by building shapes from components (e.g., sticks, clay balls) and drawing shapes. |
| K.CC.5b Count to answer "how many?" about as many as 10 things in a scattered configuration. |  | K.CC.5b Count to answer "how many?" about as many as 20 things in a scattered configuration. |  |  |  | K.OA. 5 Fluently add and subtract within 5. |  | K.G. 6 Compose simple shapes to form larger shapes. |
| K.CC.5c Given a number from 0-10 count out that many objects. |  | K.CC.5c Given a number from 0-20 count out that many objects. |  |  |  |  |  |  |
| 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. Include groups with up to 10 objects. Using: matching strategies, counting strategies. |  | K.CC. 7 Compare two numbers between 1 and 10 presented as written numerals. |  |  |  |  |  |  |
| K.G.1a Describe objects in the environment using names of shapes (square, triangle, circle, rectangle, hexagon, and octagon). |  |  |  |  |  |  |  |  |

Basic and Proficient Tens Frame Exit Tickets 1 and 2

## Name

$\qquad$ Date $\qquad$


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Advanced Tens Frame Exit Ticket 3

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Proficient Picture Addition Game and exit ticket 4


Exit Ticket 5: Basic


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Problem Solvers
Date
Problem Work Space



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