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Georgia Performance Standards Framework for Mathematics – Kindergarten

Unit 6 Organizer: “JOINING AND SEPARATING” (6 weeks)

OVERVIEW:

In this unit students will:

- develop an understanding of situations in which addition and subtraction are appropriate;
- understand how addition and subtraction affect quantities;
- understand how addition and subtraction are related to each other;
- use multiple representations and a variety of strategies to describe and solve problem situations;
- build number combinations, with an emphasis on doubles, to 10; and
- use counting strategies for sets that have been put together, removed, or are compared.

Although the units in this instructional framework emphasize key standards and big ideas at specific times of the year, routine topics such as counting, time, money, positional words, and patterns should be addressed on an ongoing basis through the use of calendar, centers (tubs), and games.

The tasks in these units illustrate the type of learning activities that should be utilized when teaching mathematics. To assure that this unit is taught with the appropriate emphasis, depth, and rigor, it is important that the tasks listed under evidence of learning be reviewed early in the planning process. A variety of resources should be utilized to support learning, including textbooks and other published curriculum materials. These materials can provide much needed content development and can be a rich source for additional learning activities.

ENDURING UNDERSTANDINGS:

- When two quantities are put together, the result is more than either of the original quantities.
- When some objects are removed from a set of objects, what is left is less than the original quantity.
- When one quantity is compared to another, the first quantity is either more than, less than, or equal to the second quantity.
- Problems can be solved in a variety of ways.
- Problems can be modeled using various representations, including concrete objects, pictures, number sentences, and words.
- Various combinations of numbers and operations can be used to represent the same quantity.

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ESSENTIAL QUESTIONS:

- What happens when I put two quantities together?
- What happens when some objects are removed from a set of objects?
- How can I find the total when I put two quantities together?
- How can I find what is left when I remove one quantity from another?
- How can I compare one quantity to another?
- How can I represent problem situations and problem-solving strategies?
- How can I use different combinations of numbers and operations to represent the same quantity?

STANDARDS ADDRESSED IN THIS UNIT

Mathematical standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to emphasize the natural connections that exist among mathematical topics.

KEY STANDARDS:

MKN1. Students will connect numbers to the quantities they represent.

- h. Identify coins by name and value (penny, nickel, dime, and quarter).
- i. Count out pennies to buy items that together cost less than 30 cents.
- j. Make fair trades involving combinations of pennies and nickels or pennies and dimes.

MKN2. Students will use representations to model addition and subtraction.

- a. Use counting strategies to find out how many items are in two sets when they are combined, separated, or compared.
- b. Build number combinations up to 10 (e.g., 4 and 1, 2 and 3, 3 and 2, 4 and 1 for five) and for doubles to 10 (3 and 3 for six).
- c. Use objects, pictures, numbers, or words to create, solve, and explain story problems (combining, separating, or comparing) for two numbers that are each less than 10.

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RELATED STANDARDS:

MKN1. Students will connect numerals to the quantities they represent.

- a. Count a number of objects up to 30.
- b. Produce models for number words through ten.
- c. Write numerals through 20 to label sets.
- e. Compare two or more sets of objects (1-10) and identify which set is equal to, more than, or less than the other.
- f. Estimate quantities using five and ten as a benchmark. (e.g. 9 is one five and four more. It is closer to two fives or one 10 than it is to one five.)

MKD1. Students will pose information questions, collect data, organize, and record results using objects, pictures, and picture graphs.

MKP1. Students will solve problems (using appropriate technology).

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

MKP2. Students will reason and evaluate mathematical arguments.

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

MKP3. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

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MKP4. Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

MKP5. Students will represent mathematics in multiple ways.

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

CONCEPTS/SKILLS TO MAINTAIN:

Although many students may have attended pre-school prior to entering kindergarten, this is the first year of school for some students. For that reason, no concepts/skills to maintain will be listed at this time. It is expected that teachers will differentiate to accommodate those students that may enter kindergarten with prior knowledge.

SELECTED TERMS AND SYMBOLS:

The following terms and symbols are often misunderstood. These concepts are not an inclusive list and should not be taught in isolation. However, due to evidence of frequent difficulty and misunderstanding associated with these concepts, instructors should pay particular attention to them and how their students are able to explain and apply them.

The definitions below are for teacher reference only and are not to be memorized by the students. Teachers should present these concepts to students with models and real life examples. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers.

Combine: Put together sets, join sets, add

Separate: Take away, remove, subtract

Compare: Describe how sets relate to each other using terms like more, less, or equal, heavier/lighter, etc.

Quantity: the amount of objects

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EVIDENCE OF LEARNING:

By the conclusion of this unit, students should be able to demonstrate the following competencies:

- Represent the combining of two sets.
- Represent the separating of a set into two sets.
- Model addition and subtraction problem situations using various representations.
- Represent number combinations up to 10.

The following tasks represent the level of depth, rigor, and complexity expected of all kindergarten students. These tasks or a task of similar depth and rigor should be used to demonstrate evidence of learning.

Combine Example
Separating Example
Double the Fun
Make Ten
Take it to the Bank
It's All in the Bag
My Own Math Story

Culminating Activity: “My Own Math Story”

Students will use the picture provided to create a math problem situation.

STRATEGIES FOR TEACHING AND LEARNING:

- Students should be actively engaged in developing their own understanding of contexts, concepts, and strategies.
- Teachers should encourage students to use and explain a board range of student-invented strategies.
- Students should appropriately use multiple representations such as objects, pictures, numbers, words, and other symbols.
- Students should use appropriate manipulatives, technology, and other mathematical tools to support their problem solving.

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- Teachers should promote the development of written and oral communication by having students share their thinking, strategies, and understanding.
- Students should revise their work based on teacher feedback, peer feedback, and metacognition, which includes self-assessment and reflection.

Classroom Routines

The importance of continuing the established classroom routines cannot be overstated. Daily routines must include such obvious activities such as taking attendance, doing a lunch count, determining how many items are needed for snack, lining up in a variety of ways (by height, age, type of shoe, hair color, eye color, etc.), daily questions and calendar activities. They should also include less obvious routines, such as how to select materials, how to use materials in a productive manner, how to put materials away, how to open and close a door, how to do just about everything! An additional routine is to allow plenty of time for children to explore new materials before attempting any directed activity with these new materials. The regular use of the routines are important to the development of students' number sense, flexibility, and fluency, which will support students' performances on the tasks in this unit. See Unit 1 for suggestions concerning specific ideas for classroom routines.

TASKS:

The following tasks represent the level of depth, rigor, and complexity expected of all kindergarten students. These tasks or a task of similar depth and rigor should be used to demonstrate evidence of learning.

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• Combine Example

Combine Example

Listen to your teacher tell a story.

While you are listening, try to imagine what is happening in the story.

Discussion, Suggestions, Possible Solutions

The teacher will tell a story like: The other day I saw 3 dogs chasing a ball in the park. Then 2 more dogs came and joined them in playing ball.

After telling the story, students should be asked questions like:

- *What is my story about?*
- *What happened first?*
- *What happened next?*
- *What are the dogs doing in the park?*
- *Can we act out the story?*
- *How many dogs were there at the beginning of the story? (Feel free to let the students act and bark like dogs.)*
- *How many dogs are there all together at the end of the story?*
- *How do you know?*

Continue questioning as needed until the students can answer questions and understand what is happening in the story. This comes through repeated exposure to this type of problem. As the unit continues, reinforce counting and separating by presenting many varied problem situations that require the same thought process in this problem.

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- **Separate Example**

Separate Example

Listen to your teacher tell a story.
While you are listening, try to imagine what is happening in the story.

Discussion, Suggestions, Possible Solutions

The teacher will tell a story like: There were three bunnies at the pet store. One went home with a new family.

After telling the story, students should be asked questions similar to the ones in the Combining Example task above.

Variation:

How is the ' dogs in the park ' story different from the bunny story?

After the students have done many examples, begin to mix the situations so that they decide if the story requires combining or separating.

As students become more familiar with these problem situations, teachers should begin to incorporate modeling with counters and the vocabulary of addition and subtraction. Encourage students to record what happens in the story using pictures, words, and numbers.

Variation:

Use books such as Mouse Count by Ellen Stoll Walsh.

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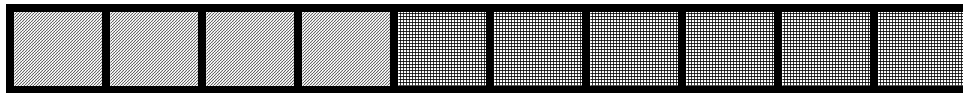
- **Make Ten**

Make Ten

Using your ten-strip, you and your partner should make tens in as many ways as possible. One of you will use blue cubes and one of you will use red cubes. After you have built each ten, color your paper to show what you have built. You have 15 minutes to make as many as possible.

Discussion, Suggestions, Possible Solutions

Monitor, encourage, and question the students as they work to model math talk. After the 15 minutes are up, lead students in a discussion about the ways they made ten. Allow the children to shade a ten strip on the board to share their examples. The teacher should use markers with colors matching the colors of the cubes to write mathematical statements such as:



4 and 6 make 10.

4 plus 6 equals 10.

To preview first grade, $4 + 6 = 10$ may also be written, but it should not be stressed or assessed.

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- **Double the Fun**

Double the Fun

Using the dominoes your teacher gives you, find the dominoes that have the same number of dots on both sides. Record your results by drawing a picture of each domino you find with the same number of dots on each side.

Discussion, Suggestions, Possible Solutions

Begin this task by demonstrating what a double domino looks like. (Remove the double six domino from the set.) Have students give suggestions of how they can identify the double domino as they sort. Let the students sort the dominoes, observing and questioning as they work.

When everyone is finished, allow volunteers to share their results. Ask questions that make the students summarize how to identify doubles such as:

How many doubles did you find?

How many dots are there in all for each double?

Variation:

Ask students what other things come in doubles.

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• Take it to the Bank

Take it to the Bank

Your group is going to play a banking game.

One of you will be the banker, one will be the customer, and one will be the accountant.

- The banker will be given a baggie of pennies.
- The customer will be given a baggie of nickels and dimes.
- The accountant will be given a recording sheet.
- The customer will go to the bank to exchange a nickel or a dime for the correct number of pennies.
- The banker will give the customer the correct number of pennies.
- The accountant will observe, check, and record each turn.

After each turn, change jobs until everyone in your group has had a chance to play each job at least once.

Discussion, Suggestions, Possible Solutions

Make two baggies for each group of three students.

One baggie should contain 15 pennies. The other baggie should contain 1 dime and 1 nickel. Monitor the groups listening for mistakes and appropriate math talk. (Heterogeneous groups may work best. Rearrange groups as necessary.)

Discuss with the class what they learned letting the students explain what they did and what it means.

Variation:

Students may be able to compare a nickel and a dime by comparing the number of pennies each equals. They also may be able to recognize that two nickels make a dime or other combinations.

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- **It's All in the Bag**

It's All in the Bag

You will be given a bag with items inside.

Look carefully at how many items are in your bag and how many are in your partner's bag.

Tell how the number of items in your bag compares to the number of items in your partner's bag using the words more than, less than, or equal to.

Describe how you got your answer.

Discussion, Suggestions, Possible Solutions

Prepare about 15 bags with different numbers of items in them (counters, blocks, ribbons, etc.).

Do not put more than 10 items in a bag.

Place all bags in a tub or a box in the middle of your whole group.

Explain to children that they will compare items between two students.

Review the language they are to use when comparing (more, less and equal).

Be sure that they are able to explain how many more / less they have and how they know.

Suggested questions:

How many blocks does Devin have?

How many blocks does Terrell have?

Who has more? How many more?

Who has less? How many less?

How did you figure that out?

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- **Culminating Task**

This culminating task represents the level of depth, rigor and complexity expected of all kindergarten students to demonstrate evidence of learning.

Unit 6 Culminating Task: “MY OWN MATH STORY”

Using the picture, create your own math story like the problem situations that were studied in this unit.
You will share your story and how you know it fits the picture.

Suggestions for Classroom Use

While this task may serve as a summative assessment, it also may be used for teaching and learning. It is important that all elements of the task be addressed throughout the learning process so that students understand what is expected of them.

- Peer Review
- Display for parent night
- Place in portfolio
- Photographs

Discussion, Suggestions and Possible Solutions

Using a picture like the one below, have the students create an original math story to share. As they share, be sure they are using appropriate math talk; and they are demonstrating comparing, combining and/or separating. Encourage classroom discussion concerning the math in each story.

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