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Georgia Performance Standards Framework for Mathematics – Kindergarten

Unit 4 Organizer: “SORTING, COMPARING AND ORDERING” **(4 weeks)**

OVERVIEW:

In this unit students will:

- measure using direct comparison of objects;
- compare measures of length, capacity, height, and weight by direct comparisons (longer/shorter, more/less, taller/shorter, heavier/lighter); and
- group objects according to common properties.

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.

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 supplement, but not completely replace, the textbook. Textbooks not only provide much needed content information, but excellent learning activities as well. The tasks in these units illustrate the types of learning activities that should be utilized from a variety of sources.

ENDURING UNDERSTANDINGS:

- Comparing length, weight, capacity, and height of objects is important.
- Information can be organized and recorded.
- Data can be collected and organized with models, pictures, and graphs.

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ESSENTIAL QUESTIONS:

- How can I compare objects by their size?
- Which items are heavier or lighter than others?
- How can I organize my information?
- How can I record my results?

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:

MKM1. Students will group objects according to common properties such as longer/shorter, more/less, taller/shorter, and heavier/lighter.

- a. Compare and order objects on the basis of length.
- b. Compare and order objects on the basis of capacity.
- c. Compare and order objects on the basis of height.
- d. Compare and order objects on the basis of weight.

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

RELATED STANDARDS:

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

- a. Count a number of objects up to 30. (For this unit we will go to 20.)
- b. Produce models for number words through ten.

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- 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.)

MKG2 Students will understand basic positional relationships.

- a. Identify when an object is beside another object, above another object, or below another object.
- b. Identify when an object is in front of another object, behind another object, inside another object, or outside it.

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.

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.

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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 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.

Capacity: the amount of space inside or the largest amount that can be held by a container

Height: how high an object is; how far up a thing goes

Length: the distance from one point to another

Taller: a word used when comparing the height of two objects

Shorter: a word used when comparing the height or length of two objects

Longer: a word used when comparing the length of two objects

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Weight: how heavy a thing is

Heavier: a word used when comparing the weight of two objects

Lighter: a word used when comparing the weight of two objects

EVIDENCE OF LEARNING:

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

- Compare and order objects relating to length, height, weight, capacity, and size.
- Pose questions and collect data related to geometric shapes.
- Organize and record information concerning basic shapes using objects, pictures and picture graphs.

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.

- Mine is Longer Than Yours
- Rumpelstiltskin Is My Name
- Scavenger Hunt
- Taller Than a Tower of Ten
- How Heavy Is It?
- Jack The Giant
- Ordering Containers
- What's the Size?

Culminating Activity: “What’s the Size?”

Students will visit four different stations representing the different measuring experiences they discovered during this unit. The four stations will provide opportunities to show mastery of the measurement concepts involved in length, weight, height, and capacity.

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These real world measurement opportunities will include examples of 2-D and 3-D objects that students have studied. Students will compare and order the objects based upon the measurement attribute given at each station. Students will record their findings with models, pictures, and in graphical/chart format.

STRATEGIES FOR TEACHING AND LEARNING:

- Students should be actively engaged by developing their own understanding.
- Mathematics should be represented in as many ways as possible by using graphs, tables, pictures, symbols and words.
- Appropriate manipulatives and technology should be used to enhance student learning.
- Students should be given opportunities to 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 as taking attendance, doing a lunch count, 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.

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TASKS:

The collection of the following tasks represents the level of depth, rigor and complexity expected of all kindergarten students to demonstrate evidence of learning.

- **Mine is Longer Than Yours**

Mine is Longer Than Yours

- Listen as your teacher reads a book on comparing sizes to the class.
- With a partner, play the game, “Mine is Longer Than Yours.” Reach in the bag and take a piece of curling ribbon and lay the ribbon out in a straight line. Your partner will pull a piece out of the bag and lay the ribbon beside your piece. Compare your two ribbons. The partner with the longer ribbon will keep both pieces of ribbon. If the pieces are the same length, partners pull another piece and add to the piece that they have already. Continue playing the game and taking turns until the bag is empty. Count up the total number of ribbons that each player has. The winner has the most ribbons. Each player then lays out all his/her ribbons in a straight line and compares the total length. Who has the longer total length? Discuss this with your partner.
- The next time you play this game the rules change. Put all ribbons back into the bag and play the game again but see who has the shorter ribbon. The partner with the shorter ribbon takes both. Again, the partner with the most ribbons wins.

Discussion, Suggestions, Possible Solutions

Begin by reading a book on size comparisons such as The Best Bug Parade by Stuart Murphy.

Students should be grouped with partners for this task.

The teacher should provide each pair of students with a bag of ribbons. Explain the rules of the game to the students.

Observe partners as they make their comparisons. Listen for the use of correct vocabulary.

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- **Rumpelstiltskin (or whatever book is read) Is My Name**

Rumpelstiltskin (or whatever book is read) Is My Name

Activity:

- Think of the longest word you know.
- Look where it is written on the board.
- Let's count the number of letters in that word.
- Is this word longer or shorter than your name?
- How long is your name? Print your first name on an index card.
- Make a tower with the connecting cubes to represent the number of letters in your name.
- Tell about your group's towers.

Discussion, Suggestions, Possible Solutions

After brainstorming long words, choose 2-3 words to write on the board. Lead a discussion on the length of the words, student names and how they compare.

The teacher may show the students his/her name printed on an index card and build a tower corresponding to his/her name as an example.

Show students the recording sheet and explain how they are to record the names of students in their group whose names are shorter, longer, or the same length as their own. Put students into groups of 5 for this task.

After finishing the recording sheet, have students draw, tell or write about their group's letter towers.

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Comparing Names Record Sheet:

My name is _____ . There are _____ letters in my name.

Shorter	Same	Longer
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> </div> <div style="display: flex; justify-content: space-around;"> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> </div>	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> </div> <div style="display: flex; justify-content: space-around;"> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> </div>	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 2px;"></div> </div> <div style="display: flex; justify-content: space-around;"> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> <div style="background-color: #cccccc; width: 40px; height: 20px; margin: 2px;"></div> </div>

Observe as students fill in their chart. Look for possible misconceptions and note correct usage of vocabulary terms.

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• Scavenger Hunt

Scavenger Hunt

- You are going on a scavenger hunt to find items that are longer, shorter, or the same length as objects you have placed on your table. Listen to your teacher for directions.
- Your teacher will give you a Scavenger Hunt Recording Sheet. Draw the objects on your table at the end of each sentence on the “Scavenger Hunt” sheet.
- Find a partner from your group who has hair shorter or longer than yours. Discuss who has which and begin your hunt.
- Search for items that answer each question. On the activity sheet, draw or write the names of the objects that you find with your partner.
- Return to your seat after you find 5 items that correctly fit in the sentences on your sheet.

Discussion, Suggestions, Possible Solutions

Discuss comparison of length. Hold up two objects without aligning their endpoints and question students about the importance of common endpoints.

Tell students they are going on a Scavenger Hunt. Explain that, as a group, they are to decide on five objects of varying sizes to use for comparison on their hunt. Give some examples like books, pencils, crayons, glue sticks, paperclips, etc. They are to lay the objects they have chosen on their table. Give each student “The Scavenger Hunt” handout. Have them draw each object on their table at the end of one of the sentences. All students in the group do not have to put the objects in the same order. Different orders between partners will encourage more productive discussion. For example, a pair of scissors may be longer than a paperclip but shorter than a book. Students can have these discussions when deciding where to place the objects on their recording sheet.

Students should choose a partner from their group. A fun way to choose partners is by asking students to find a partner that has shorter or longer hair than they have.

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Give each child a handout for recording and begin the hunt.

When students are finished, let them discuss their findings. Stress the importance of aligning endpoints on both objects to compare length. Observe as students compare to make sure they are lining the endpoints up correctly.

Additional Resource:

*NCTM: Navigation Series – Navigating through Measurement in Pre-kindergarten - Grade 2 **String Lengths**: p. 18 -20*

Scavenger Hunt activity sheet (below)

Scavenger Hunt List

1. A _____ is longer than a _____ .
2. A _____ is shorter than a _____ .
3. A _____ is the same length as a _____ .
4. A _____ is shorter than a _____ .
5. A _____ is longer than a _____ .

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- **Taller Than a Tower of Ten**

Taller Than a Tower of Ten

- Students will build a tower of ten cubes to use for comparing.
- Look through the box of objects in your center.
- Use your tower to sort the objects. Find items that are shorter, taller, or the same height as your Tower of Ten.
- Now, record your answers on the recording sheet at the center. Draw pictures to show your answers in the correct column.
- Share your answers with the others at the center. Do you all agree on the answers?

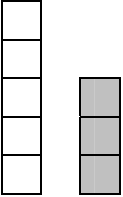
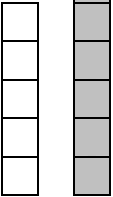
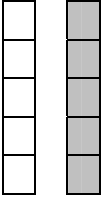
Discussion, Suggestions, Possible Solutions

*The teacher should demonstrate this activity to whole class before groups begin the activity.
Observe students as they work through this activity and support as needed.*

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See the sample recording sheet below.

Tower of Ten

Shorter	Taller	Same
		

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- **How Heavy Is It?**

How Heavy Is It?

Activity:

- Listen to the book about weighing objects as your teacher reads. Where have you seen scales used?
- Have you ever seen or played on a seesaw? What happens when you play on a seesaw?
- Compare the weights of different items in the center and discuss which is heavier and which is lighter with your group.
- Weigh two of the items using the teddy bear counters or other objects provided by your teacher. Record the weights of these items by drawing a picture and telling the number of teddy bear counters needed to balance the scale. Share your answers with others in your group.

Discussion, Suggestions, Possible Solutions

- *Using a book such as Hershey's Weights and Measures by Jerry Pallota or One-Eyed Jake by Pat Hutchins will make a good hook into this task.*
- *It would be helpful for the teacher to show real examples or pictures of scales. Discuss where they see these in the real world - the grocery store, the doctor's office, the bathroom.*
- *Demonstrate how a scale shows a measure of weight on the dial. Explain that the balance scale is like a seesaw, comparing the weight of two objects. Help students develop the concept of weight by holding several objects such as a tennis ball and golf ball or marble (both are spheres) in their hands. Compare the weights when they are placed in the scale. Be sure to use the terms heavier and lighter.*
- *Have students work in centers to compare a set of common objects and discuss the weight comparisons.*
- *You may extend the lesson by having students use teddy bear counters to compare the weights of two different*

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objects. Model for students how to “weigh” an object, using the number of teddy bear counters to balance or equal the weight of the object.

- *With partners, allow students to use a balance scale and weigh four small objects. Have them weigh each object by balancing the object with the correct number of teddy bear counters and record the weights. Students will draw the object and indicate the number of teddy bears needed to balance the scale.*

Additional Resource:

*NCTM: Navigation Series – Navigating through Measurement in Pre-kindergarten - Grade 2 **Body Balance:** p.14 -15*

Objective: compare weight

• **Jack the Giant**

Jack the Giant

- Listen as your teacher reads the story about Jack and the Beanstalk. Are you taller or shorter than Jack?
- Compare your height with someone in the room who is taller and shorter than you are.
- Using adding machine tape, work with a partner to measure your height. Repeat for your partner. Write your name on the strip. Talk with your partner using the terms taller and shorter to compare each other’s heights.
- Now place your strip on the wall in the classroom or hall to show your height in comparison to others in the class. Practice discussing with others and use the terms, taller and shorter.

Discussion, Suggestions, Possible Solutions

- *Discuss that a person’s height can be measured by using the same strategies that were used when the lengths of different objects were measured, such as the tower of ten and direct comparison of objects.*

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- *Have the class compare the heights of two students using the words height, taller and shorter.*
- *Be sure students write their names on their own height strips.*
- *Discuss and compare the heights within the class.*
- *An extension would be to read and discuss the poem Who's Taller? by Shel Silverstein.*

Extension Activity: Place students in groups of two and have them trace each other on butcher paper. Have them use nonstandard units such as a book, shoe, or tower of ten cubes to measure their heights. Have them make charts showing their data. They record their name and the number of units tall they are.

- **Ordering Containers**

Ordering Containers

Work with your teacher to order the different containers from the one that holds the least amount to the one that holds the most.

Discussion, Suggestions, Possible Solutions

The teacher will collect different sizes of containers for a capacity center. Allow children to use a substance (sand, water, rice, beans, etc.) to fill the containers. Discuss which container holds the most, or the least. Order them from the least to the greatest. Allow groups to check the ordering of the containers.

Extension activity: Read the book The Mitten by Jan Brett.

Discuss how many more animals could possibly fit in the mitten. Where also could that many animals fit?

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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 4 Culminating Task: “WHAT’S THE SIZE?”

- You need to visit each measurement station and compare and order at least 3 objects.
- Put them in an order that makes sense to you.
- Draw a picture of your work and explain how you ordered the items.
- Can you compare and order the items in a different way? Draw a picture and explain your math thinking.

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

The task assumes that students have multiple opportunities comparing and ordering objects based on length, capacity, height, and weight. In addition to comparing, students should have experience with ordering objects.

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Grouping: Independent

Classroom Setting: Set up four comparing stations which focus on length, capacity, height, and weight.

Materials: A variety of objects found in the classroom or brought from home by the students and teachers should be collected which can be used for comparing length, capacity, height, and weight. Include 2-D and 3-D shapes for comparison at one of the stations.

- *A good introduction to measurement that will encourage class discussion is the book, Fattest, Tallest, Biggest Snowman Ever by M. Rex.*
- *The students should directly compare at least 3 objects that they choose from each station.*
- *The students will compare and order the objects based upon the measurement attribute given at each station.*
- *Students should be encouraged to extend their thinking by repeating the task using more than 3 items to compare and order from each measurement station.*