Lesson 11

Objective: Compare volume using the same as with sand and explore conservation.

Suggested Lesson Structure

- Fluency Practice (6 minutes)
- Application Problem (3 minutes)
- Concept Development (13 minutes)
- Student Debrief (3 minutes)
- Total Time (25 minutes)

Fluency Practice (6 minutes)

- Sand Observations PK.MD.1 (3 minutes)
- Tallies in the Sand PK.CC.3a (3 minutes)

Sand Observations (3 minutes)

Materials: (S) Sand, trays, shoebox lid or other similar wide, flat container for working in the sand

Note: This activity introduces working with sand to provide exploration time in a cognitively light task before focusing on the tasks of today’s Concept Development.

1. Distribute the trays of sand, establish guidelines, and model the care of usage of the materials.
2. Direct students to carefully sweep the sand to one side of the tray with one hand and then the other. Have them redistribute it to cover the bottom of the tray.
3. As they work, let them observe that the same amount of sand can take on various forms.

Tallies in the Sand (3 minutes)

Materials: (S) Sand, trays, shoebox lid or other similar wide, flat container for working in the sand

Note: This activity gives students additional time to get acquainted with the sand while drawing tallies.

1. Begin with sand covering the bottom of the tray so that students have a large enough writing surface.
2. Show a number of objects, and have students tally them as they did on paper.
3. If using a shoebox lid or other rectangular tray, encourage them to bump the top and bottom when they draw their tallies as they would if using handwriting lines.
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Application Problem (3 minutes)

Materials: (T) Tall, thin glass; short, wide glass (both glasses should hold the same amount); rice

Show students both glasses, and encourage students to reason about which container holds more. Then, fill the taller glass with rice. Ask students what they think will happen when the contents from the tall container are poured into the shorter container. Will it overflow? Will there be more room above the rice? Will it fill the container to the top? Guide students to see that both containers hold the same amount, and encourage a discussion as to why this is so.

Note: This activity leads into the Concept Development as it gets at the misconception that a taller container must hold more than a shorter container. In the Concept Development, students discover that the contents may look different in different-sized or -shaped containers, but the amount is conserved.

Concept Development (13 minutes)

Part 1: Concept Introduction

Materials: (T) Two clear plastic cups with smiley faces drawn (label “Mr. Cup” and “Mrs. Cup”); two clear pints: a tall, thin container and a short, wide container; sand in a bucket; clear plastic shampoo and drink container (for Student Debrief)

Note: Choose containers carefully. Be sure that all of the sand in the plastic cups fits into the tall and short pint containers.

1. Show a plastic cup filled with sand. Say, “This is Mr. Cup. Here is his wife, Mrs. Cup.” Show an empty, identical plastic cup.
2. Pour the sand from the plastic cup (Mr. Cup) into the identical plastic cup (Mrs. Cup). Pour the sand back and forth: “Look! They hold the same amount of sand!”
3. Say, “Tell your neighbor about Mr. and Mrs. Cup.” Lead students to say things such as, “Mr. Cup holds the same amount of sand as Mrs. Cup.”
4. Show two pints: a tall, thin container and a short, wide container. Call on two students to pour one of the cups of sand into the tall container and the other cup of sand into the short container.
5. Ask, “Do these containers still hold the same amount of sand?” Allow for discussion and debate.
6. Then, verify that the amount of sand is still the same by inviting students to pour the sand back and forth between containers. Allow for discussion each time: “Did we add more sand?” (No.) “Did we take some sand away?” (No.) “The amount of sand stays the same, even when it is poured into different containers.”

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Facilitate partner discussions using turn and talk. Turn and talk provides students who are developing language a model and an opportunity to ask questions. Also, a partner discussion allows the teacher to check for understanding of students who may shy away from sharing within the large group.
Part 2: Practice

Materials: (S) Several sets of two clear plastic cups (label “Mr. Cup” and “Mrs. Cup”); two clear pints: a tall, thin container and a short, wide container; bag or bucket of sand

Note: Set up tables so that groups of 2 or 3 have a set of materials.

1. Say, “In your groups, put the same amount of sand into Mr. and Mrs. Cup.”
2. Say, “Pour the sand into the other containers, and talk about what happens.”
3. As students manipulate the sand, circulate and describe what they are doing, using parallel talk. For example, “Marin is noticing that the tall container holds the same amount of sand as the short container,” or “Ryan says that even though it looks different, the amount of sand stays the same.”

Student Debrief (3 minutes)

Lesson Objective: Compare volume using the same as with sand and explore conservation.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience. It is also an opportunity for informal assessment. Consider taking anecdotal notes or using a simple checklist to note each child’s progress toward meeting the lesson objective.

As students complete the Practice portion of the Concept Development, listen for misconceptions or misunderstandings that can be addressed in the Debrief.

Any combination of the questions below may be used to help students express ideas, make connections, and use new vocabulary (same).

- Talk with a neighbor about what happened when we poured the same amount of sand into a tall, thin container and a short, wide container.
- Think about the tall, thin container and the short, wide container. If you were really thirsty, would the tall, thin container be better to use, or would the short, wide container be better? Why?
- (Hold up a clear shampoo container and a clear drink container.) How can we figure out which one holds more?
- How do you think grown-ups know how much is in a container?

Center Connection:

Place several different containers at the sand and water tables. Be sure to include tall, thin containers, as well as short, wide containers. Allow children to pour between containers, experiencing conservation as they witness that the volume of a substance doesn’t change when transferred to a new container.