Measurement Stations

Four Groups for Four Stations **25-45 minutes**

Materials (Read the attached directions sheet for more details.)

- **For Capacity I :** 5-8 containers of different sizes and shapes; sand; large tub for working in
- **For Capacity II :** 3 see-through containers of different shapes, but similar sizes (one could be a plastic zipper bag); cubes in three colors, enough of each color to fill one of the containers
- **For Weight I :** one or two pan balances; play-dough; 4-6 objects of different sizes, weights & densities
- **For Weight II :** one or two pan balances; sets of 3 types of items that are similar in size & shape, but different in weight (wooden cube, foam cube & ceramic tile; golf ball, ping-pong ball & marble) – multiple pieces of each item

Introduce the Activity

Distribute attached directions and note-taking sheet to all participants. Explain that they will be circulating to the different stations in small groups and that each group will go in a different order.

Depending on the amount of time available, groups can work their way through two, three, or four stations. (Participants need to spend at least 5 minutes at each station, and some time must be allowed for discussion, as well.) If there is only time for two stations, make sure that each group visits one capacity station and one weight station.

Explore Measurement

While groups are working at the stations, circulate to provide support and to ask probing questions. Remind those at Capacity I, Capacity II & Weight I that they ***may not use numbers***.

Conclude the Activity

Ask participants to share insights into measurement that they have gained through engaging in these activities.

Emphasize that measurement need not be numerically precise to be useful.

Measurement Stations Emphasizes:

- A single object has many measurable attributes: *What kind of "big" is it?*
- To measure, the attribute needs to be defined & an appropriate procedure planned & carried out.
- Measurement is never entirely exact.

Key Questions to Ask

- *Why do we ask you not to use numbers at three of the stations?*
- *Can you think of real-life situations when measuring without numbers is the sensible choice?*

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early mathematics education

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Station	Learning Notes: *How did you figure out the problems?* *What was most interesting to you?* *What was most confusing?*	Application Notes: *What could children learn from an activity similar to this?* *What questions would you ask them?* *What might be confusing or challenging?*
<u>Capacity I</u> Fill empty containers with sand. Which container holds the most? the least? How do you know? Can you prove it WITHOUT numbers?		
<u>Capacity II</u> Compare three containers filled with cubes. Which holds the most? The least? How do you know? Can you prove it WITHOUT numbers?		
<u>Weight I</u> Choose an object to weigh in the pan balance. Add play-dough until the scale is balanced. Was your first chunk of play-dough too heavy, too light or just right? Try again with another object and another chunk of play-dough. Does it weigh more or less than the first? How do you know? Can you order the set of objects by weight through indirect comparison only? How can you prove that your order is correct WITHOUT numbers?		
<u>Weight II</u> Use the pan balance to order your three different types of items by weight. How do you know? Can you figure out the relative weights of each pair of items? (You may use numbers for this solution.) Can you prove it?		