

## Measure Up for the Garden

**Grade Level:** 4<sup>th</sup>

**Title of Lesson:** Measure Up for the Garden

**Performance Standard(s) Covered:**

MCC4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express hr, min, and sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.

**Essential Question:** What are the different units of measurement?

**Objective:** Students will be able to measure liquid volume and demonstrate the different units of measurement to 100% accuracy.

**Key Words and Terms:**

- Fertilizer
- Liquid volume

**Learning Activity**

**Abstract:**

Students will measure liquid volume and mix “fertilizers” to apply to the garden.

**Materials Needed:**

- Garden
- A container of brightly dyed green water to represent fertilizer
  - Green food dye
  - Milk jug or other large, enclosed container
  - Water
- Graduated cylinders (one per team of students)
- Water
- Goggles (one per student)
- Gloves (one pair per student)
- Paper towels (enough for cleanup)
- Beakers (two per team)
- Stirrers (one per team)

**Safety Concerns:**

Even though it is not real fertilizer instruct students to be careful and to not touch, inhale, or ingest the “fertilizer”.

**Procedure:**

1. Teacher preparation:
  - a. Premix the “fertilizer” before class. Add green food dye to a jug full of water until it is bright green.
2. Teach the students about what liquid volume is and how to measure it.
3. Do some practice as a class before beginning the experiment.
4. Explain to students what fertilizer is and how to properly use it.
5. Begin experiment with students (see lab report for more detailed instruction)
  - a. Assign students to teams of two and explain to students the safety precautions.
  - b. Have students collect materials –
    - i. two pairs of goggles
    - ii. two pairs of gloves
    - iii. two beakers
    - iv. one graduated cylinder
  - c. Have students come to the front wearing their gloves and goggles and have them measure out the desired amount of “fertilizer” into their beaker.
  - d. When students return to their desks have students measure out the desired amount of fertilizer into their graduated cylinder and pour into their empty beaker
  - e. Have students fill their graduated cylinder with water to the desired amount and pour into the beaker.
  - f. Stir the mixture.
  - g. Once each group is fully mixed have students clean up their area and take them to the garden to apply their fertilizer.

## **Measure Up in the Garden Lab Report**

It is time to fertilize the garden! You and your partner will mix up fertilizer to use in the school garden so your vegetables can grow big and strong!

### **Materials Needed:**

- Garden
- One graduated cylinder
- Water
- One set of goggles per teammate
- One pair of gloves per teammate
- Paper towels for clean up
- Two beakers
- One stirrer

### **Safety Concerns:**

Do not touch, inhale, or ingest the “fertilizer”.

### **Procedure:**

1. Collect all materials.
2. Put on your safety goggles and gloves.
3. Approach the front of the classroom with one beaker and measure out 150mL of fertilizer.
4. Once you have returned to your desk measure 50mL of fertilizer using your graduated cylinder and pour it into your empty beaker
5. Next, fill your graduated cylinder with 50mL of water from the sink and add it to your measured beaker of 50mL of fertilizer.
6. Stir your fertilizer mixture until blended.
7. Answer these questions while you wait for time to go outside
  - a. How many milliliters of fertilizer mixture do you have in your beaker?
  - b. How many milliliters of pure fertilizer is left in the original beaker?
  - c. If everyone in the class combined their fertilizer mixture how many milliliters would they have?
  - d. Why is it important to measure accurately?

8. Once it is time to go to the garden gather your fertilizer mixture and take it with you.
9. When you are in the garden find two plants to fertilize and give each plant 50mL of fertilizer.
10. Return to the classroom and clean up your area.

**Review**

Complete the chart below.

<b>What you measured</b>	<b>Hectoliter</b>	<b>Decaliter</b>	<b>Liter</b>	<b>Deciliter</b>	<b>Centiliter</b>	<b>Millimeter</b>	<b>Microliter</b>
<b>Beaker of Pure Fertilizer at First Measurement</b>							
<b>Beaker of Mixed Fertilizer and Water</b>							
<b>Beaker of Pure Fertilizer after Mixture</b>							