

Lesson 1.6: Measuring and the Silent Measurement Challenge

Unit: Unit 1, Kitchen Skills and Smart Eating (Nutrition and Wellness) **Topic:** 1.2 Tools, Measuring, and Recipes **Grade:** 6 to 8 (written at grade 7; see Differentiation for the grade 6 support and grade 8 stretch) **Days:** 2 class periods of 40 minutes **Room:** FACS lab with kitchen stations (a no-kitchen version is below; this lesson needs counters and a sink, not a stove)

Standards

- NYS module line: NYS N&W 1. Culinary Management c) Demonstrate accurate measuring of dry/solid, liquid, and small quantity ingredients
- CTE theme line: CTE PSI 1. Problem Solving e) Demonstrate personal development of problem-solving skills through practice of these skills in a variety of classroom applications
- CTE theme line: CTE CIR 1. Communication b) Describe types of communication (e.g., oral, verbal, nonverbal, digital)
- NYS FACS Learning Standard 1 (Intermediate), Key Idea: Students will use an understanding of the elements of good nutrition to plan appropriate diets for themselves and others. They will know and use the appropriate tools and technologies for safe and healthy food preparation.; Performance Indicator: Students understand the relationships among diet, health, and physical activities; evaluate their own eating patterns; and use appropriate technology and resources to make food selections and prepare simple, nutritious meals.
- CDOS Standard 3a Universal Foundation Skills: Basic Skills
- National FCS 3.0: 8.5.3 Show portion control and correct scaling and measuring.

Enduring understanding and essential question

Big idea: Measuring is the difference between a recipe that works and one that does not. Dry, liquid, and small amounts each have their own tool and their own technique, and a scale does not lie. **Essential question:** How close is close enough, and how would you know?

Objectives

By the end of this lesson, students will be able to:

1. (Low) Given the five abbreviations (tsp, Tbsp, c, oz, lb) and the three equivalents (3 tsp = 1 Tbsp, 16 Tbsp = 1 c, 8 fl oz = 1 c liquid), state what each means and convert between them.
2. (Mid) Given a measurement card, measure dry, liquid, and small-quantity ingredients using the correct tool and technique so that each lands within the target band on a gram scale.

3. (High) After the Silent Measurement Challenge, evaluate the team's results against the scale, explain which technique error caused each miss, and judge how the team communicated without words.

Vocabulary

Tier 2 (general academic): accurate, equivalent, convert, level, nonverbal Tier 3 (FACS): dry measuring cup, liquid measuring cup, measuring spoon, level off, eye level, meniscus, gram scale, tare. See the unit vocabulary list (Vocabulary 01.md) for Turkish, Portuguese, and Spanish.

Materials and setup

- Day 1, five practice stations, each with the same kit: a nested set of dry measuring cups, a glass liquid measuring cup, a set of measuring spoons, a straight edge (the back of a butter knife), a small bowl, a tray or sheet pan to catch spills. Station ingredients: A flour (a 2 lb bag in a wide container with a scoop), B sugar (same setup), C water (a pitcher), D vegetable oil (a small bottle, a funnel for pouring back), E salt (a wide-mouth container).
- Day 1, one gram scale per station if the room has them; if not, one scale at the teacher desk for spot checks. *[Sal: a five-pack of kitchen scales runs about \$60 and pays for itself in this lesson alone; add to the unit budget if the room has fewer than three.]*
- Day 1, Measuring Practice handout, one per student: Handout 01.06 - Measuring Practice and Equivalents.md
- Day 2, the Silent Measurement Challenge kit per team (four teams of five to seven): the same tools as Day 1, containers of flour, sugar, water, oil, and salt, six paper cups or small bowls labeled 1 to 6, a team card. Cards: Handout 01.06 - Silent Measurement Challenge Cards.md (four different team cards, A to D, and the teacher scoring sheet).
- Day 2, one gram scale at the teacher weigh-in table; the scoring sheet on a clipboard; a visible scoreboard on the board.
- Slides: Slides 01.06 - Measuring and the Silent Measurement Challenge.md (Day 1 and Day 2 marked)
- Setup notes: Day 1, fill the containers wide enough to scoop from; tape a "spill here" tray at each station; put the flour and sugar at the two stations farthest from the sink. Day 2, calibrate the scale with a known weight (a nickel is 5.0 g); measure each target on the cards yourself with the room's own cups and flour the day before and write your numbers on the scoring sheet, since flour weight changes with the bag and the humidity. Allergy check: flour dust; a student with a wheat allergy measures sugar and salt at the flour station or works with rice instead.

Pre-assessment

Day 1 do now. Also look at the Tools Check from Lesson 1.5: any student who confused the dry and liquid cups on item 1 needs the eye-level demo twice.

Do now and hook (Time: 4 min, each day)

Day 1, on the board: “A recipe says 1 c flour. Your friend scoops the cup into the bag and packs it down. Is that 1 cup? Yes or no, and why.” Debrief: hand vote, two reasons each side. Hook: put a packed cup of flour and a spooned-and-leveled cup of flour on the scale, one after the other. The packed one weighs about 30 grams more, which is about a quarter cup extra. “That is why your cookies were bricks.”

Day 2, on the board: “Write one way to tell a teammate ‘stop, that is too much’ without using your voice.” Debrief: two students show theirs. Hook: “Today nobody talks. Six measurements, one scale, points for accuracy. The scale is the judge.”

Procedure

Step	Teacher will	Students will	Time
Day 1, 1. Direct instruction and demo: three techniques	Show and say each technique. Dry: spoon it in, do not pack, level off with a straight edge. Liquid: pour into the glass cup on the counter, bend down, read the line at eye level (the bottom of the curve is the meniscus). Small quantities: measuring spoons, level for dry, fill to the brim for liquid, over the bowl, not over the mix. Then the abbreviations and the equivalents on one slide; have the class say each one back twice.	Watch, copy the three techniques and the equivalents table onto the handout (Part 1), and chant the equivalents when cued.	10 min
Day 1, 2. Practice stations	Assign pairs to a starting station. Rotate every 3 minutes with the reset cue. At each station a pair measures the two amounts on the	Measure the two amounts at each station (for example, 1/2 c flour and 1 Tbsp flour; 1/4 c sugar and 1 tsp sugar; 1 c water and 2 Tbsp water; 2	16 min

	station card, checks one on the scale if a scale is there, and records. Circulate with the clipboard checklist.	Tbsp oil and 1/2 tsp oil; 1 tsp salt and 1/4 tsp salt). Record the technique used and, if a scale is there, the grams (Part 2). Return the ingredient to the container.	
Day 1, 3. Equivalents practice	Run the conversion set on the handout (Part 3): six problems, including one that doubles a recipe line and one that halves it. Check as a class.	Complete Part 3 alone, then compare with a partner.	6 min
Day 2, 1. Rules of the Challenge	State the rules once, slowly, from the slide: no talking, no writing notes to each other; pointing, gestures, and showing the card are allowed; one measurer at a time, the rest watch and signal; each cup gets one measurement; a cup that is touched after it is set down is done. Assign teams and hand out the cards. Model one silent correction (hold up a hand, point at the line).	Listen, hold up the team card, and take a station.	4 min
Day 2, 2. The Silent Measurement Challenge	Start the timer. Say nothing except the time calls at 6 and 10 minutes. Watch how teams handle a disagreement; note one example per team for the debrief.	Measure the six items on the team card into the six labeled cups, in silence, with a different team member measuring each item. Carry the	12 min

		tray to the weigh-in table when done.	
Day 2, 3. Weigh-in and scoring	Tare the scale for each cup, weigh each item, read the grams out loud, and score against the target band on the scoring sheet: 3 points within the tight band, 2 within the wide band, 1 outside but the right ingredient in the right cup, 0 for a wrong ingredient or an empty cup. Post team totals on the board.	Watch the weigh-in, record their team's grams and points on the handout (Part 4), and mark which item missed.	8 min
Day 2, 4. Debrief	Two questions, one at a time. First, why measuring matters: show the slide on baking chemistry (flour is the structure, sugar is the sweetness and the browning, baking powder is the lift; too much of one throws off the others). Ask each team which miss was a technique error (packed flour, read the liquid from above, heaped spoon). Second, how did you communicate: ask each team for the one signal that worked and the one moment they wished they could	Answer for their team. Write the technique error for each miss and one sentence on how the team communicated (Part 4).	8 min

	talk. Name what they did: nonverbal communication.		
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Questions to ask

Monitor understanding:

- How many teaspoons are in a tablespoon? How many tablespoons in a cup?
- Where do your eyes go when you read a liquid measuring cup?
- Why do you level a dry cup and not a liquid cup?
- Which item on your card was the hardest to get right, and why?

Deepen learning:

- The scale said your flour was 20 grams over. Where did the extra come from?
- A bakery weighs flour instead of using cups. Why would they do that?
- You could not talk today. What did your team do instead, and did it work better or worse than talking?
- If you doubled a recipe and it only called for 1 1/2 tsp of baking powder, how would you measure 3 tsp with the fewest scoops?

Check for understanding

Day 1 clipboard checklist during Step 2: for each pair, a yes or no on “uses the right tool,” “levels dry and reads liquid at eye level,” and “records the equivalent correctly.” A pair with three yeses at two stations in a row is ready for the Challenge. Day 2: the weigh-in itself is the check; a team with four or more items in the tight band has the technique.

Closure (Time: 4 min, each day)

Day 1: 3-2-1 exit card: 3 equivalents from memory, 2 techniques you will use in the Challenge tomorrow, 1 thing that still confuses you about measuring. Three students read one line aloud. Sort into “got it” and “needs more”; the “needs more” pile decides who measures the liquid items at the Challenge (with a partner watching).

Day 2: one sentence on the exit card: “Next time I measure ___ I will ___ because the scale showed ___.” Two students read theirs. Keep the cards; they are the review before the performance check.

Differentiation and supports

- ELL: the Challenge is silent by design, so every student is on the same footing; the abbreviations slide has the full word and a picture next to each; the handout has the Turkish, Portuguese, and Spanish words for cup, spoon, level, and measure (see Vocabulary 01.md); sentence starter for the debrief: “Our team showed ___ by ___.”

- IEP and 504 (general): the equivalents table stays on the board all year; a student who cannot scoop can be the team's checker who reads the card and signals; extended time on Part 3; the scoring bands are generous on purpose so a near miss still scores.
- Grade 6 support: team cards use only cups and whole spoons (no $\frac{1}{8}$ tsp, no $\frac{2}{3}$ c); the conversion set stops at doubling.
- Grade 8 stretch: team cards include a mixed item ($1\frac{1}{2}$ Tbsp oil, which is $4\frac{1}{2}$ tsp) and a "make $\frac{3}{4}$ c with only a $\frac{1}{4}$ c and a $\frac{1}{2}$ c" item; the stretch conversion set includes halving $1\frac{1}{2}$ tsp and scaling a recipe from 4 servings to 6. After the Challenge, the stretch team computes the percent error for each item.
- UDL checkpoint used: multiple means of engagement (a team game with a scoreboard and a scale as the judge) and multiple means of action and expression (gestures replace speech; recording by grams, by points, or by a marked diagram).
- No-kitchen alternative: this lesson needs only a table, water in a pitcher, dry goods in containers, and a tray to catch spills. Run it in any classroom. If there is no scale, the teacher checks each cup by pouring it into a calibrated cup and eyeballing the line, and the scoring bands become "on the line," "close," and "off." *[Sal: even one \$12 scale changes this lesson; carry it in.]*

Assessment

Objective	Standards met	Learning task	Assessment (formative or summative; tool)
1. State and convert abbreviations and equivalents	N&W 1. c); CDOS 3a Basic Skills	Equivalents practice, Day 1 Step 3	Formative; handout Part 3 checked against the key, scored as daily work
2. Measure dry, liquid, and small quantities within the target band	N&W 1. c); Std 1 PI A; National FCS 8.5.3	Practice stations, Day 1 Step 2; the Challenge, Day 2 Step 2	Formative on Day 1 (clipboard checklist); the Challenge score is daily work; summative on Assessment 01.2 (measuring station, scale-checked)
3. Evaluate the results and the team's nonverbal communication	PSI 1. e); CIR 1. b); CDOS 3a Basic Skills	Weigh-in and debrief, Day 2 Steps 3 and 4	Formative; handout Part 4 scored complete, partial, or missing

Objectives 1 and 2 are assessed summatively on Assessment 01.2, Tools and Measuring Performance Check, at the start of Lesson 1.8.

Homework

None. Optional: find a measuring cup or spoon at home and measure one thing your family uses every day (rice, cereal, coffee). Bring the number.

Connections

Math: fractions on the number line, adding fractions with unlike denominators ($\frac{3}{4}c = \frac{1}{2}c + \frac{1}{4}c$), and doubling and halving; the math teacher can use the equivalents table as a warm up the same week. Science: the baking chemistry slide (leavening, structure, browning) previews the science teacher's chemical reactions unit; the gram scale and the tare button are a measurement lesson in themselves.

Sources

- NYS Middle Level CTE FACS Content Module 05, Nutrition and Wellness (nycetecenter.org, June 2018), line 1. c). Copy in 02 Standards/NYS Module PDFs/.
- NYS Middle Level CTE Theme Module 05, Problem Solving and Innovation, line 1. e); Theme Module 02, Communication and Interpersonal Relationships, line 1. b). Same folder.
- NYS Learning Standards for Health, Physical Education, and Family and Consumer Sciences (1996), Standard 1, Intermediate, FACS strand. Wording per 02 Standards/STANDARDS SOURCES - web research.md, section 2. *[Sal: confirm against the NYSED PDF.]*
- CDOS Intermediate Standard 3a, Basic Skills. Same file.
- National Standards for Family and Consumer Sciences Education 3.0 (LEAD FCS Education, 2018), competency 8.5.3.
- Sal's own materials: the Silent Measurement Challenge, as described in his FACS Games write up and Queens College portfolio (see 01 Source Analysis/Brentwood Work and Simulations.md). No original file exists; this lesson writes it out for the first time.
- Gram targets: water $1c = 237\text{ g}$; flour, spooned and leveled, about 120 to 125 g per cup; granulated sugar 200 g per cup; table salt about 6 g per tsp; vegetable oil about 14 g per Tbsp. *[Sal: replace with your own weigh-in the day before; the scoring sheet has a column for it.]*

Teacher notes

- If Day 1 runs short, cut the practice stations to four (drop oil; the Challenge cards still include it, which is fine, the technique is the same as water). Never cut the packed vs spooned flour demo; that is the hook for the whole lesson.
- Common mistake: reading the liquid cup from above. Put a strip of tape at counter height on the wall by each sink that says "eyes here."
- The Challenge gets loud in the last two minutes when a team disagrees in silence. That is the point. Let it happen, then talk about it.

- *[Sal: your note says the Challenge is ELL friendly by design. Say that out loud to the class after the debrief; students who are quiet in English are often the best at this game, and they should hear why.]*
- Save the scoring sheets. The team totals become the seed for the station assignments in Lab 1: spread the strongest measurers across the three kitchens.