Main idea: "Mixed unit" (continued from Module 2)
- "Mixed unit" is shorthand for addition
  - Examples: "2 yd 5 ft" *means* "2 yd + 5 ft"
  - Review of mixed numbers (Module 5): "$2\frac{5}{8}$" *means* "$2 + \frac{5}{8}$"
  - Minor note: we make as many of the larger unit as possible (e.g., 36 oz as a mixed unit is 2 lb 4 oz and not 1 lb 20 oz)
- Use properties of addition (associative, commutative) and distributive property to add (and subtract)

* Lessons 4-11, 14 (solving word problems) provide opportunities for students to develop and demonstrate MP.3 "Construct viable arguments and critique the reasoning of others."

Materials:
- Balance [Lesson 1]
- Measuring cups, jars, pitchers (borrow from Grade 5 manipulatives kit) [Lessons 2, 12]
- Rulers, yardstick or measuring tape [Lessons 12, 16]
- Protractors [Lesson 16]

* Great Minds' Suggestions for Consolidation or Omissions: "Module 7 affords students the opportunity to use all that they have learned throughout Grade 4 as they first relate multiplication to the conversion of measurement units and then explore multiple strategies for solving measurement problems involving unit conversion. Module 7 ends with practice of the major skills and concepts of the grade as well as the preparation of a take-home summer folder. Therefore, **it is not recommended to omit any lessons from Module 7**."

A. Measurement Conversion Tables

Lessons 1-2: Create conversion tables for length, weight, and capacity units using measurement tools, and use the tables to solve problems.

Definitions:
- The mixed unit "12 pounds 10 ounces" means "12 pounds + 10 ounces"
- To "convert 12 pounds 10 ounces to ounces" means to "find how heavy 12 pounds 10 ounces is in ounces (12 pounds 10 ounces = ? ounces)"
- Customary units:
  - 1 pound = 16 ounces
  - 1 yard = 3 feet
  - 1 foot = 12 inches
1. Lesson 1 Concept Development (CD) Problems 1-3 (Lesson 1 Practice Sheet); Problem Set 1, 3, 5a
   - Convert pounds to ounces, yards to feet, feet to inches
     - Recommendation: include products in conversion chart to make explicit how conversion values are calculated (see next page)

Pounds	Ounces
1	16
2	2 x 16 = 32
3	3 x 16 = 48

- Use the definition of mixed unit to express a mixed unit measurement in terms of a smaller unit

    $12 \; pounds \; 10 \; ounces$

    $= \; 12 \; pounds + 10 \; ounces$ by definition of mixed unit

    $= \; (12 \; \times 16 \; ounces) + 10 \; ounces$

    $= \; 192 \; ounces + 10 \; ounces$

    $= \; 202 \; ounces$

- Materials: see p. 14 of Teacher Edition

2. Lesson 2 CD Problems 1-4 (Lesson 2 Practice Sheet); Problem Set 1, 5b & d
    - Convert gallons to quarts, quarts to pints, pints to cups; relate smaller units to larger units
        - Recommendations:
            - Include products in conversion chart to make explicit how conversion values are calculated
            - Provide graphic organizer or linear model (see p. 30 of Teacher Edition) that shows relationship between gallon, quart, pint, cup

Gallons	Quarts	Pints	Cups
		1	2
	1	2	(2 x 2 = 4)
1	4	(4 x 2 = 8)	(8 x 2 = 16)

- Use the definition of mixed unit to express a mixed unit measurement in terms of a smaller unit
- Materials: see p. 28 of Teacher Edition

Lesson 3: Create conversion tables for units of time, and use the tables to solve problems.

1. CD Problems 1-4 (Lesson 3 Practice Sheet); Problem Set 2, 4b-c
    - Convert minutes to seconds, hours to minutes, days to hours
        - Recommendations:
            - Include products in conversion chart to make explicit how conversion values are calculated

■ Provide graphic organizer that shows relationship between day, hours, minutes, seconds

Days	Hours	Minutes	Seconds
		1	60
	1	60	(60 x 60)
1	24	(24 x 60)	(24 x 60 x 60)

- Use the definition of mixed unit to express a mixed unit measurement in terms of a smaller unit

Lesson 4: Solve multiplicative comparison word problems using measurement conversion tables.
1. CD (Problem Set)
   - Solve word problems that involve finding "*n* times as much" and measurement conversion from larger unit to smaller unit

Lesson 5: Share and critique peer strategies.
1. CD (Problem Set)
   - Build on Lessons 1-3 to find the total length of the set of tape diagrams
   - Create a problem that could be represented by the given set of tape diagrams

B. Problem Solving with Measurement

Lesson 6: Solve problems involving mixed units of capacity.
1. CD Problems 1-2; Problem Set 1c & g, 2b
   - Build on Lesson 2 (unit conversion for capacity) to add or subtract different units or mixed units of capacity

Lesson 7: Solve problems involving mixed units of length.
1. CD Problems 1-2; Problem Set 1c-d, 2f
   - Build on Lesson 1 (unit conversion for length) to add or subtract different units or mixed units of length

Lesson 8: Solve problems involving mixed units of weight.
1. CD Problems 1-2; Problem Set 1c-f
   - Build on Lesson 1 (unit conversion for weight) to add or subtract different units or mixed units of weight

<h3 style="color:gray">Lesson 9: Solve problems involving mixed units of time.</h3>

1. CD Problems 1-2; Problem Set 1c & f, 2b & d
   - Build on Lesson 3 (unit conversion for time) to add or subtract different units or mixed units of time

<h3 style="color:gray">Lessons 10-11: Solve multi-step measurement word problems.</h3>

1. Lessons 10-11 CD (Problem Sets)
   - Solve multi-step word problems involving addition, subtraction, multiplication, and/or division of different or mixed units of measurement

<h2 style="color:gray">C. Investigation of Measurements Expressed as Mixed Numbers</h2>

<h3 style="color:gray">Lessons 12-13: Use measurement tools to convert mixed number measurements to smaller units.</h3>

1. Lesson 12 CD Problems 1-3; Problem Set 1b, 6d-e
   - Use definitions of customary units to express capacity or length in a smaller unit as a fraction or mixed number of a larger unit, and vice versa
     - $1 \ quart = \frac{1}{4} \ gallon$
     - $1 \ foot = \frac{1}{3} \ yard$
     - $1 \ inch = \frac{1}{12} \ foot$
     - $4\frac{1}{2} \ feet = \left(4 + \frac{1}{2}\right) \times 12 \ inches = (4 \times 12) + \left(12 \times \frac{1}{2}\right) = 48 + 6 = 54 \ inches$
   - Suggestion: use "double unit" number line and label "1" for each unit
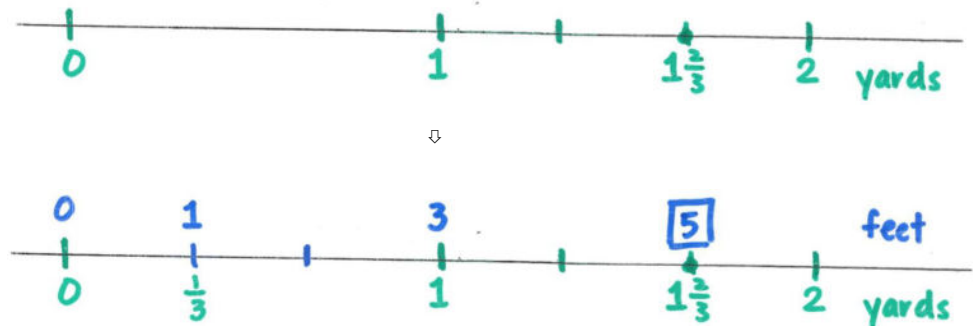
2. Lesson 13 CD Problems 1-2; Problem Set 1c, 3c, 5c & g
   - Use definitions of customary units to express weight or time in a smaller unit as a fraction or mixed number of a larger unit, and vice versa
     - $1 \ ounce = \frac{1}{16} \ pound$
     - $1 \ minute = \frac{1}{60} \ hour, \ 1 \ hour = \frac{1}{24} \ day$
   - Suggestion: use "double unit" number line and label "1" for each unit
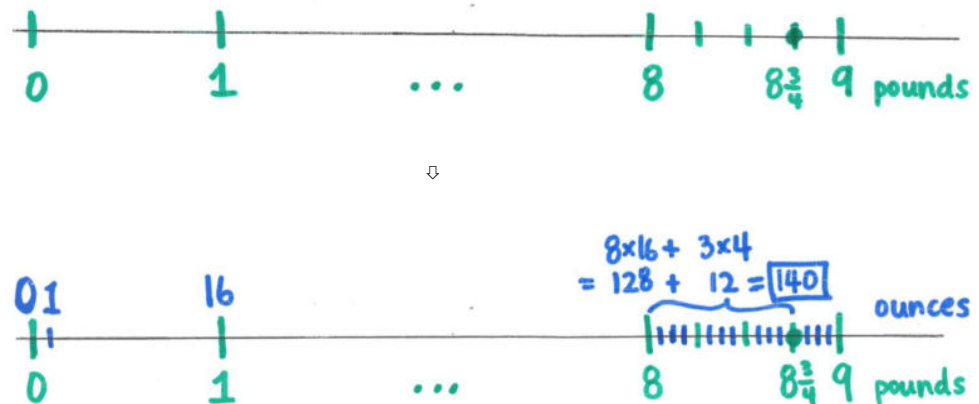
Lesson 14: Solve multi-step word problems involving converting mixed number measurements to a single unit.

1. CD (Problem Set)
   - Solve multi-step word problems involving addition, subtraction, and/or multiplication of mixed units of measurement (and conversion to single unit of measurement)

D. Year in Review

Lessons 15-16: Create and determine the area of composite figures.

1. Lesson 15 CD (Problem Set)
   - Review/reinforce Grade 3 Module 4 Lessons 13-14 (area of rectilinear figure) with customary units (feet, square feet)
2. Lesson 16 CD (Problem Set)
   - Build on Module 4 Lesson 15 (construction of rectangles) & Grade 3 Module 4 Lessons 15-16 (areas of rooms in floor plan) to draw floor plan and find areas given dimensions of rooms and furniture

Lesson 17: Practice and solidify Grade 4 fluency.

Lesson 18: Practice and solidify Grade 4 vocabulary.