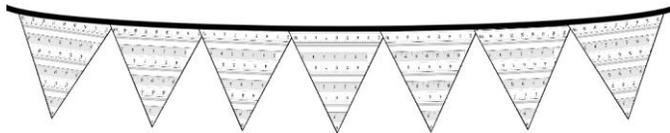# 4th Grade Math

Module 2: Unit Conversions and Problem Solving with Metric Measurement

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. Module 2 of Eureka Math (Engage New York) covers Unit Conversions and Problem Solving with Metric Measurement.

Focus Area ▶ Topic A: *Metric Unit Conversions*

Words to Know:

Measurement – quantity as determined by comparison with a standard unit

Convert - to express a measurement in a different unit

Distance -the length of the line segment joining two points

Mixed Unit – refers to numbers that are paired but represent individual entities or units. Take the number 35. Written this way, it represents 35 ones. That is 35 of the same unit. However, if we write 3 tens 5 ones, then we have mixed units because the 3 and the 5 are conveying different meanings.

These are all examples of mixed units!

- 2 hundreds 5 tens
- 2 hr 5 min
- 2 km 5 m
- 2 ft 5 in
- $2.50
- $2\frac{5}{8}$

OBJECTIVES OF TOPIC A

▶ Express metric length measurements in terms of a smaller unit; model and solve addition and subtraction word problems involving metric length.
▶ Express metric mass measurements in terms of a smaller unit; model and solve addition and subtraction word problems involving metric mass.
▶ Express metric capacity measurements in terms of a smaller unit; model and solve addition and subtraction word problems involving metric capacity.

Focus Area ▶ Topic A: *Metric Unit Conversions*

Converting Units

Students review place value concepts while building fluency to decompose or convert from larger to smaller units. They learn 1 meter (m) is equal to 100 centimeters (cm) just as 1 hundred is equal to 100 ones. The table below continues this thinking.
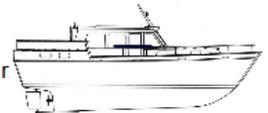
Length km = kilometers m = meters	Weight/Mass kg = kilograms g = grams	Capacity L = liters mL = milliliters
1 km = 1,000 m	1 kg = 1,000 g	1 L = 1,000 mL
2 km = 2,000 m	2 kg = 2,000 g	2 L = 2,000 mL
15 km = 15,000 m	15 kg = 15,000 g	15 L = 15,000 mL
24 km = 24,000 m	24 kg = 24,000 g	24 L = 24,000 mL

Students use this knowledge of unit conversion to solve addition and subtraction problems involving mixed units.

Example Problem and Answer

The length of Tom's boat 11 m 62 cm. His neighbor's boat is 2 m 59 cm longer. How long is the neighbor's boat?

Neighbor's Boat
?

Tom's Boat	Amount Longer

11 m 62 cm   2 m 59 cm

This student set up tape diagram to better understand the problem.

The tape daigram shows that the length of the neighbor's boat can be found by adding the two parts together.

$$\begin{array}{r} 11\text{ m} \quad 62\text{ cm} \\ +\ \ 2\text{ m} \quad 59\text{ cm} \\ \hline 13\text{ m} \ 121\text{ cm} \end{array}$$

A number bond is used to convert 121 cm into 1 m 21 cm.

1 m   21 cm

13 m + 1 m + 21 cm = 14 m 21 cm

The length of the neighbor's boat is 14 m 21 cm.

In this example, the units are added separately. The meters are added together and the centimeters are added together. Then the centimeters are converted to meters.

Can you think of another way to solve it?

Converting Units

Conversions between the units are recorded in a two-column table. Recording the unit conversions in a table allows students to see the ease of converting from a smaller unit to a larger unit.
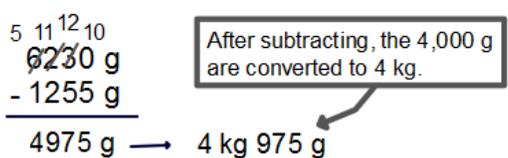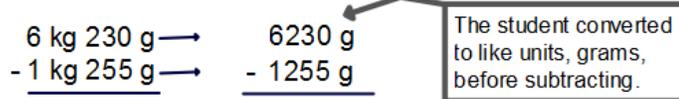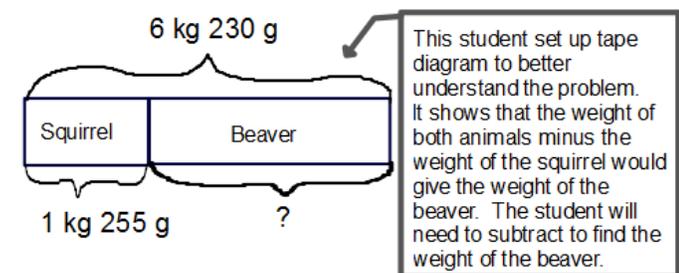
Example Problem	Answer

Liquid Capacity

L	mL
1	1,000
5	
38	
	49,000
54	
	92,000

Liquid Capacity

L	mL
1	1,000
5	5,000
38	38,000
49	49,000
54	54,000
92	92,000

Strategies for Adding and Subtracting Mixed Units

Students will be taught several different strategies for adding and subtracting mixed units. In the following example, the student will use an **algorithm strategy** and decompose or convert the kilograms to grams before solving.

Example Problem and Answer

Together, a squirrel and a beaver weigh 6 kg 230 g. If the squirrel weighs 1 kg 255 g, how much does the beaver weigh?

6 kg 230 g

Squirrel	Beaver

1 kg 255 g   ?

This student set up tape diagram to better understand the problem. It shows that the weight of both animals minus the weight of the squirrel would give the weight of the beaver. The student will need to subtract to find the weight of the beaver.

6 kg 230 g ⟶ 6230 g
- 1 kg 255 g ⟶ - 1255 g

The student converted to like units, grams, before subtracting.

$$\begin{array}{r} 5 \ 11 \ ^{12}10 \\ 6\cancel{2}\cancel{3}\cancel{0} \ g \\ - \ 1255 \ g \\ \hline 4975 \ g \end{array}$$ ⟶ 4 kg 975 g

After subtracting, the 4,000 g are converted to 4 kg.
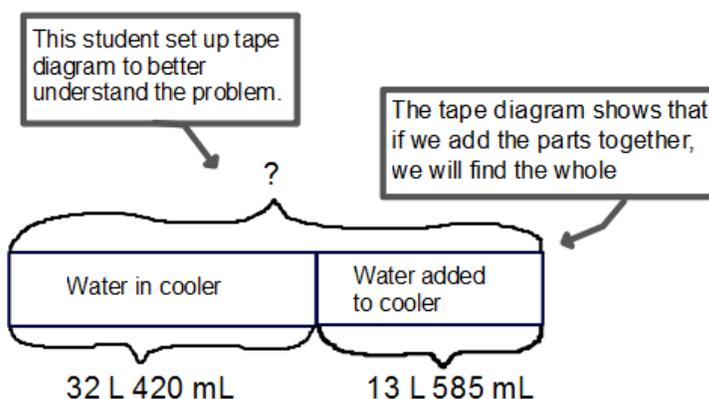
The beaver weighs 4 kg 975 g.

Strategies for Adding and Subtracting Mixed Units

Addition and subtraction single-step problems of metric units provide an opportunity to practice using simplifying strategies as well as solve using the addition and subtraction algorithm. In this next example, the student uses the simplifying strategy.
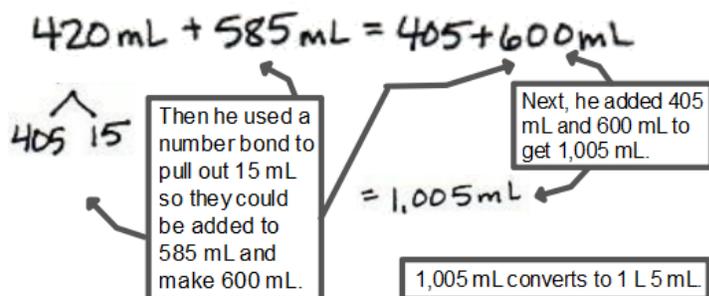
Example Problem and Answer

Jon had a cooler that had 32L 420mL of water in it. He emptied a container with 13L 585mL of water into the cooler. How much water is in the cooler now?

This student set up tape diagram to better understand the problem.

The tape diagram shows that if we add the parts together, we will find the whole

?

Water in cooler	Water added to cooler

32 L 420 mL   13 L 585 mL

The first thing this student added was the liters.

$$32 \ L + 13L = 45 \ L$$

$$420 \ mL + 585 \ mL = 405 + 600 \ mL$$

$$405 \overset{\wedge}{} 15$$

Then he used a number bond to pull out 15 mL so they could be added to 585 mL and make 600 mL.

Next, he added 405 mL and 600 mL to get 1,005 mL.

$$= 1,005 \ mL$$

1,005 mL converts to 1 L 5 mL.

$$45L + 1L + 5mL = 46 \ L \ 5mL$$

The cooler has 46 L 5 mL of water in it.