Math Series
Measurement

Measuring Volume and Weight

careertech
RCCTA Resource Center for CareerTech Advancement

Oklahoma Department of Career and Technology Education
Resource Center for CareerTech Advancement

Printed in the United States of America by the
Oklahoma Department of Career and Technology Education
Stillwater, OK 74074-4364

Measuring Volume and Weight

As consumers, we often make purchases based on volume and weight. A driver may buy 5 gallons of gasoline, a gardener may purchase 58 ounces of fertilizer, and a shopper may purchase a 2-liter bottle of soda. If a store is selling a 20-ounce bottle of soda for one price and a 2-liter bottle for another price, which bottle is the better deal?

We also use measurements of volume and weight at home. A recipe may ask for 2 tablespoons of butter. If you have one stick of butter, how much of the stick should you use? A household cleanser may require ½ cup of the cleanser be mixed with 1 gallon of water. If you have only a 2-quart bucket, how much cleanser should you add? Learning how to measure volume and weight can help you answer these questions every day.

You use different tools to measure volume and weight every day. You are probably already familiar with measuring cups and measuring spoons. Other tools are used to measure volume and weight on the job. These include BEAKERS, GRADUATED CYLINDERS, SCALES, and BALANCES.

SPECIFIC OBJECTIVES

1. Identify the units used to measure volume.
2. State the abbreviations of units used to measure volume.
3. State the formulas for converting units of volume from the metric system to the English system.
4. Convert units of volume between the metric and English systems. (Assignment Sheet 1)
5. Identify the units used to measure weight.
6. State the abbreviations of units used to measure weight.
7. State the formulas for converting units of weight from the metric system to the English system.
8. Convert units of weight between the metric and English systems. (Assignment Sheet 2)
9. Explain how to convert units of volume and weight between larger and smaller units.
10. Convert units of volume measurement. (Assignment Sheet 3)

11. Convert units of weight measurement. (Assignment Sheet 4)
12. State principles for adding and subtracting units of volume and weight.
13. Calculate measurements of volume using addition and subtraction. (Assignment Sheet 5)
14. Calculate measurements of weight using addition and subtraction. (Assignment Sheet 6)
15. Solve word problems involving volume and weight measurements. (Assignment Sheet 7)

Focus Assignment

Find three (3) household items that are packaged and measured by volume. Then, find three (3) household items that are packaged and measured by weight. What units of volume and weight are used?

objective 1 IDENTIFY THE UNITS USED TO MEASURE VOLUME.

words
you should know

VOLUME	measurement of how much space a liquid or dry substance occupies
	--> **NOTE:**The U.S. customary system has both dry and liquid units to measure volume. Though these units share the same name, they do not equal the same amount. For example, a dry pint is not the same as a liquid pint, and a dry quart is not the same as a liquid quart.

Liquid units are often used in cooking to measure both liquid ingredients (such as water or milk) and dry ingredients (such as salt, sugar, flour, and butter). *Dry units* are usually used to measure fresh produce (such as a quart of berries or a bushel of apples). General usage does not distinguish between the two by referring to either "dry" or "liquid" measurements. However, you can distinguish between them by the context in which they are used.

- ENGLISH UNITS-LIQUID
  - 3 teaspoons = 1 tablespoon
  - 16 tablespoons = 1 cup
  - 2 cups = 1 pint
  - 2 pints = 1 quart
  - 4 quarts = 1 gallon
  - 16 fluid ounces = 1 pint

- METRIC UNITS
  - 1,000 milliliters = 1 liter
  - 100 centiliters = 1 liter
  - 10 deciliters = 1 liter
  - 10 liters = 1 dekaliter
  - 100 liters = 1 hectoliter
  - 1,000 liters = 1 kiloliter

- ENGLISH UNITS-DRY
  - 12 units = 1 dozen
  - 2 pints = 1 quart
  - 8 quarts = 1 peck
  - 4 pecks = 1 bushel

Did You Know?

It takes 24 gallons of water to make one pound of plastic, 101 gallons to make one pound of wool or cotton, 1,851 gallons to refine one barrel of crude oil, and 62,600 gallons to produce one ton of steel.

Source: EPA, Office of Water

objective 2 STATE THE ABBREVIATIONS OF UNITS USED TO MEASURE VOLUME.

- ENGLISH UNITS
  - tsp. = teaspoon(s)
  - tbsp. = tablespoon(s)
  - c. = cup(s)
  - pt. = pint(s)
  - qt. = quart(s)
  - gal. = gallon(s)
  - fl. oz. = fluid ounce(s)
  - doz. = dozen(s)
  - pk. = peck(s)
  - bu. = bushel(s)

--> **NOTE:** Some cookbooks abbreviate teaspoon as t and tablespoon as T.

- METRIC UNITS
  - mL = milliliter(s)
  - cL = centiliter(s)
  - dL = deciliter(s)
  - L = liter(s)
  - dkL = dekaliter(s)
  - hL = hectoliter(s)
  - kL = kiloliter(s)

Did You Know?

Hoover Dam was completed in 1935 using 4.36 million cubic yards of concrete. Hoover Dam can store up to 9.2 trillion gallons of the Colorado River in its reservoir, Lake Mead.

Source: U.S. Geological Survey

Did You Know?

Each of your eyes weighs just $^{1}/_{4}$ ounce.

objective 3

STATE THE FORMULAS FOR CONVERTING UNITS OF VOLUME FROM THE METRIC SYSTEM TO THE ENGLISH SYSTEM.

ENGLISH TO METRIC-LIQUID	ENGLISH TO METRIC-DRY
1 tsp. = 4.93 mL 1 c. = 236.6 mL 1 liquid pt. = 0.473 L 1 fl. oz. = 0.0296 L 1 liquid qt. = 0.946 L 1 gal. = 3.785 L	1 dry pt. = 0.551 L 1 dry qt. = 1.101 L
METRIC TO ENGLISH-LIQUID	**METRIC TO ENGLISH-DRY**
1 mL = 0.203 tsp. 1 L = 2.11 liquid pt. 1 L = 33.8 fl. oz. 1 L = 1.057 liquid qt. 1 L = 0.2642 gal.	1 L = 1.816 dry pt. 1 L = 0.908 dry qt.

--> **NOTE:** Liquid units are approximately 14% less than dry units.

objective 4

COMPLETE ASSIGNMENT SHEET 1.

objective 5

IDENTIFY THE UNITS USED TO MEASURE WEIGHT.

words you should know

GRAVITY the force that attracts an object toward the center of the earth; the unit of gravity is the Gal (in honor of Galileo)

MASS how much material something contains

WEIGHT measurement of the effect of gravity on an object's mass

-->**NOTE:**An object's mass never changes, but its weight can change. For example, an object on the moon would have the same mass as it has on earth, but it would weigh six times less than it would on earth. This is because the effect of gravity is less on the moon.

- ENGLISH UNITS
  - 16 ounces = 1 pound
  - 2,000 pounds = 1 ton

- METRIC UNITS
  - 1,000 milligrams = 1 gram
  - 100 centigrams = 1 gram
  - 10 decigrams = 1 gram
  - 10 grams = 1 dekagram
  - 100 grams = 1 hectogram
  - 1,000 grams = 1 kilogram

Did You Know?

In 1174, a scientist from Scotland named Nevil Maskelyne was the first to calculate that the earth weighs 6.6 octillion tons. (An octillion is a 1 followed by 27 zeros.) More than $^{2}/_{3}$ of the earth is covered by water, which has a total weight of 1.55 quintillion tons. (A quintillion is a 1 followed by 18 zeros.)

objective 6

STATE THE ABBREVIATIONS OF UNITS USED TO MEASURE WEIGHT.

- ENGLISH UNITS
  - oz. = ounce(s)
  - lb. = pound(s)
  - tn. = ton(s)

- METRIC UNITS
  - mg = milligram(s)
  - cg = centigram(s)
  - dg = decigram(s)
  - g = gram(s)
  - dkg = dekagram(s)
  - hg = hectogram(s)
  - kg = kilogram(s)

Did You Know?

Scientists can use a special scale called a microbalance that can weigh small amounts of gases. These scales are so sensitive that they can weigh something as small as a millionth of a gram. That is less than the weight of one eyelash!

objective 7

STATE THE FORMULAS FOR CONVERTING UNITS OF WEIGHT FROM THE METRIC SYSTEM TO THE ENGLISH SYSTEM.

ENGLISH TO METRIC	METRIC TO ENGLISH
1 oz. = 28.35 g 1 lb. = 0.453 kg 1 tn. = 907.18 kg	1 g = 0.035 oz. 1 kg = 2.205 lb. 1 kg = 0.0011 tn.

objective 8

COMPLETE ASSIGNMENT SHEET 2.

objective 9

EXPLAIN HOW TO CONVERT UNITS OF VOLUME AND WEIGHT BETWEEN LARGER AND SMALLER UNITS.

- FROM LARGER TO SMALLER UNITS

RULE	Multiply the given number of larger units by the number of smaller units contained in one larger unit.
FORMULA	(given number of larger units) x (number of smaller units per larger unit) = answer in smaller units
EXAMPLE 1	How many cups are in 3 pints? Given number of larger units = 3 pints Number of smaller units per larger unit = 2 cups per 1 pint or $\frac{2 \text{ c.}}{1 \text{ pt.}}$ (3 pints) x $\frac{2 \text{ c.}}{1 \text{ pt.}}$ = 6 cups There are 6 cups in 3 pints.
EXAMPLE 2	How many liters are in 7 dekaliters? Given number of larger units = 7 dekaliters Number of smaller units per larger unit = 10 liters per 1 dekaliter or $\frac{10 \text{ L}}{1 \text{ dkL}}$ (7 dekaliters) x $\frac{10 \text{ L}}{1 \text{ dkL}}$ = 70 liters There are 70 liters in 7 dekaliters.
EXAMPLE 3	How many ounces are in 2 pounds? Given number of larger units = 2 pounds Number of smaller units per larger unit = 16 ounces per 1 pound or $\frac{16 \text{ oz}}{1 \text{ lb.}}$ (2 pounds) x $\frac{16 \text{ oz.}}{1 \text{ lb.}}$ = 32 ounces There are 32 ounces in 2 pounds.
EXAMPLE 4	How many milligrams are in 5 grams? Given number of larger units = 5 grams $\frac{\text{Number of smaller units per larger unit} = 1{,}000 \text{ milligrams per 1 gram or } 1{,}000 \text{ mg}}{1 \text{ g}}$ (5 grams) x $\frac{1{,}000 \text{ mg}}{1 \text{ g}}$ = 5,000 milligrams There are 5,000 milligrams in 5 grams.

- FROM SMALLER TO LARGER UNITS

RULE	Divide the number of smaller units by the number of smaller units in one larger unit.
FORMULA	$\frac{\text{given number of smaller units}}{\text{the number of smaller units per 1 larger unit}}$ = answer in larger units
EXAMPLE 1	How many tablespoons are in 9 teaspoons? Given number of smaller units = 9 teaspoons Number of smaller units per larger unit = 3 teaspoons per 1 tablespoon $\frac{\text{9 teaspoons}}{\text{3 teaspoons per 1 tablespoon}}$ = 3 tablespoons There are 3 tablespoons in 9 teaspoons.
EXAMPLE 2	How many hectoliters are in 240 dekaliters? Given number of smaller units = 240 dekaliters Number of smaller units per larger unit = 10 dekaliters per 1 hectoliter $\frac{\text{240 dekaliters}}{\text{10 dekaliters per 1 hectoliter}}$ = 24 hectoliters There are 24 hectoliters in 240 dekaliters.
EXAMPLE 3	How many tons are in 8,000 pounds? Given number of smaller units = 8,000 pounds Number of smaller units per larger unit = 2,000 pounds per 1 ton $\frac{\text{8,000 pounds}}{\text{2,000 pounds per 1 ton}}$ = 4 tons There are 4 tons in 8,000 pounds.
EXAMPLE 4	How many grams are in 368 centigrams? Given number of smaller units = 368 centigrams Number of smaller units per larger unit = 100 centigrams per 1 gram $\frac{\text{368 centigrams}}{\text{100 centigrams per 1 gram}}$ = 3.68 grams There are 3.68 grams in 368 centigrams.

objective 10

COMPLETE ASSIGNMENT SHEET 3.

objective 11

COMPLETE ASSIGNMENT SHEET 4.

objective 12

STATE PRINCIPLES FOR ADDING AND SUBTRACTING UNITS OF VOLUME AND WEIGHT.

ADDING UNITS

- Add like units.
- Simplify the answer by converting smaller units into larger units when possible.

EXAMPLE: Add 2 gallons 3 quarts to 1 gallon 2 quarts.

	2 gal.	3 qt.	Add quarts to quarts.
+	1 gal.	2 qt.	Then add gallons to gallons.
	3 gal.	5 qt.	

Because 5 quarts is more than 1 gallon, convert the 5 quarts into gallons.

$$\frac{5 \text{ qt.}}{4 \text{ qt. per 1 gal.}} = 1 \text{ gal. } 1 \text{ qt.}$$

Add the 1 gallon to the 3 gallons:

3 gallons 5 quarts = 3 gallons + 1 gallon 1 quart
= 4 gallons 1 quart

EXAMPLE: Add 7 pounds 12 ounces to 5 pounds 8 ounces.

	7 lb.	12 oz.	Add ounces to ounces.
+	5 lb.	8 oz.	Then add pounds to pounds.
	12 lb.	20 oz.	

Because 20 ounces is more than 1 pound, convert the 20 ounces into pounds.

$$\frac{20 \text{ oz.}}{16 \text{ oz. per 1 lb.}} = 1 \text{ pound } 4 \text{ ounces}$$

Add the 1 pound to the 12 pounds:

12 pounds 20 ounces = 12 pounds + 1 pound 4 ounces = 13 pounds 4 ounces

SUBTRACTING UNITS

- Subtract like units if possible. If not, regroup units to allow for subtraction.
- Write the answer in simplest form.

EXAMPLE: Subtract 2 cups 5 tablespoons from 3 cups 6 tablespoons.

	3 c.	6 tbsp.	Subtract tablespoons from tablespoons.
–	2 c.	5 tbsp.	Then subtract cups from cups.
	1 c.	1 tbsp.	

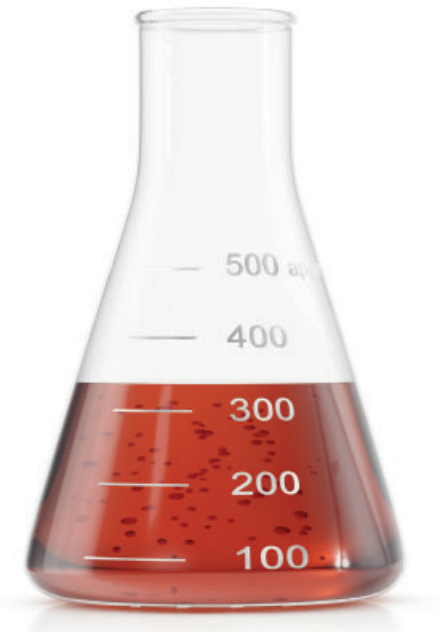
EXAMPLE: Subtract 4 pounds 10 ounces from 8 pounds 3 ounces.

	~~8~~ 7 lb.	~~3~~ 19 oz.	1 pound = 16 ounces, and 3 ounces plus 16 ounces = 19 ounces
–	4 lb.	10 oz.	
	3 lb.	9 oz.	

objective 13 COMPLETE ASSIGNMENT SHEET 5.

objective 14 COMPLETE ASSIGNMENT SHEET 6.

objective 15 COMPLETE ASSIGNMENT SHEET 7.



SUPPLEMENT 1

MORE UNITS OF VOLUME

In the English customary system, there are units for measuring liquid volume and units for measuring dry volume. There is also a third set of units that uses inches, feet, yards, and miles. These are called cubic inches, cubic feet, cubic yards, and cubic miles.

MEASUREMENT	ABBREVIATION	CONVERSION FACTOR
cubic mile	mi^3 or cu. mi.	1 cu. mi. = 5,451,776,000 cu. yd.
cubic yard	yd^3 or cu. yd.	1 cu. yd. = 27 cu. ft.
cubic feet	ft^3 or cu. ft.	1 cu. ft. = 1,728 cu. in.
cubic inch	in^3 or cu. in.	

According to the official rules of the SI units, there is no base unit of volume because volume can be expressed in terms of cubic meters, cubic centimeters, cubic millimeters, and so on. However, the original metric system did have a base unit for volume called the liter. Because this unit is so popular in countries that use the metric system, most commonly used metric measurements of volume are given in terms of liters instead of units based on cubic meters. Most scientists, however, do use units based on cubic centimeters.*

MEASUREMENT	ABBREVIATION	CONVERSION FACTOR
cubic kilometers	km^3	1 km^3 = 1,000,000,000 m^3
cubic meters	m^3	1 m^3 = 1,000 dm^3
cubic decimeters	dm^3	1 dm^3 = 1,000 cm^3
cubic centimeters	cm^3	1 cm^3 = 1,000 mm^3
cubic millimeters	mm^3	

You can use the following conversion factors to convert liters to cubic meters.

- 1 kL = 1 m^3
- 1 L = 1 dm^3
- 1 mL = 1 cm^3

* Cubic centimeters was once abbreviated as cu. cm., c.c., and cc. When speaking, scientists today still refer to a cubic centimeter as a c.c. For example, in hospital scenes on television you often hear a doctor refer to needing so many c.c.'s of medication.

SUPPLEMENT 2

METRIC CONVERSIONS—LITERS

MEASUREMENT		KILOLITERS	HECTOLITERS	DEKALITERS	LITERS	DECILITERS	CENTILITERS	MILLILITERS
ABBREVIATION		KL	HL	DKL	L	DL	CL	ML
1 kiloliter	=	1	10	100	1,000	10,000	100,000	1,000,000
1 hectoliter	=	0.1	1	10	100	1,000	10,000	100,000
1 dekaliter	=	0.01	0.1	1	10	100	1,000	10,000
1 liter	=	0.001	0.01	0.1	1	10	100	1,000
1 deciliter	=	0.0001	0.001	0.01	0.1	1	10	100
1 centiliter	=	0.00001	0.0001	0.001	0.01	0.1	1	10
1 milliliter	=	0.000001	0.00001	0.0001	0.001	0.01	0.1	1

METRIC CONVERSIONS—GRAMS

MEASUREMENT		KILOGRAMS	HECTOGRAMS	DEKAGRAMS	GRAMS	DECIGRAMS	CENTIGRAMS	MILLIGRAMS
ABBREVIATION		KG	HG	DKG	G	DG	CG	MG
1 kilogram	=	1	10	100	1,000	10,000	100,000	1,000,000
1 hectogram	=	0.1	1	10	100	1,000	10,000	100,000
1 dekagram	=	0.01	0.1	1	10	100	1,000	10,000
1 gram	=	0.001	0.01	0.1	1	10	100	1,000
1 decigram	=	0.0001	0.001	0.01	0.1	1	10	100
1 centigram	=	0.00001	0.0001	0.001	0.01	0.1	1	10
1 milligram	=	0.000001	0.00001	0.0001	0.001	0.01	0.1	1

ASSIGNMENT SHEETS

ASSIGNMENT SHEET 1

name _____ **score** _____

objective 4

CONVERT UNITS OF VOLUME BETWEEN THE METRIC AND ENGLISH SYSTEMS.

Equipment list

- calculator
- pencil

INSTRUCTIONS

Write your answers in the spaces provided.

Part 1—Convert English units to metric units

1. 3 tsp. = _____ mL
2. 5 c. = _____ mL
3. 8 dry qt. = _____ L
4. 8 liquid qt. = _____ L
5. 10 gal. = _____ L
6. 7 fl. oz. = _____ L
7. 2 gal. = _____ L
8. 20 c. = _____ mL
9. 6 dry pt. = _____ L
10. 6 liquid pt. = _____ L

Part 2—Convert metric units to English units

11. 2 L = _____ liquid pt.

12. 2 L = _____ dry pt.

13. 4 mL = _____ tsp.

14. 7 L = _____ fl. oz.

15. 10 L = _____ gal.

16. 30 mL = _____ tsp.

17. 16 L = _____ liquid qt.

18. 16 L = _____ dry qt.

19. 20 L = _____ fl. oz.

20. 5 L = _____ gal.

ASSIGNMENT SHEET 2

name _____ **score** _____

Equipment list
• calculator
• pencil

objective 8

CONVERT UNITS OF WEIGHT BETWEEN THE METRIC AND ENGLISH SYSTEMS.

INSTRUCTIONS

Write your answers in the spaces provided.

Part 1—Convert English units to metric units

1. 5 oz. = _____ g
2. 3 tn. = _____ kg
3. 9 lb. = _____ kg
4. 20 oz. = _____ g
5. 2 lb. = _____ kg

Part 2—Convert metric units to English units

6. 4 kg = _____ lb.
7. 100 kg = _____ tn.
8. 2 g = _____ oz.
9. 40 g = _____ oz.
10. 12 kg = _____ lb.

ASSIGNMENT SHEET 3

name _____ **score** _____

Equipment list

- calculator
- pencil

objective 10

CONVERT UNITS OF VOLUME MEASUREMENT.

INSTRUCTIONS

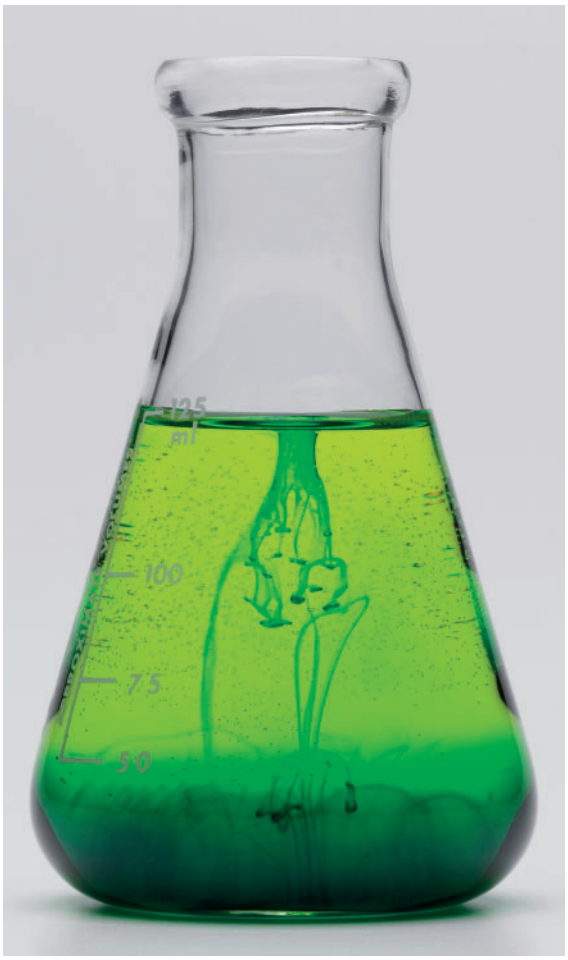
Write your answers in the spaces provided.

Part 1—Convert volume measurements from larger to smaller units

1. 8 qt . = _____ pt.
2. 7 pt. = _____ fl. oz.
3. 2 gal. = _____ qt.
4. 3 c. = _____ tsp.
5. 14 c. = _____ tbsp.
6. 1 qt. = _____ fl. oz.
7. 4 gal. = _____ pt.
8. 2 qt. = _____ c.
9. 5 pt. = _____ tbsp.
10. 1 gal. = _____ tsp.
11. 32 fl. oz. = _____ c.
12. 5 pk. = _____ qt.
13. 10 bu. = _____ pk.
14. 2 doz. = _____ units
15. 9 pk. = _____ pt.
16. 2 bu. = _____ pt.
17. 4 c. = _____ tsp.
18. 3 gal. = _____ c.
19. ½ doz. = _____ units
20. 3 bu. = _____ qt.

Part 2—Convert volume measurements from smaller to larger units

21. 12 c. = _____ pt.
22. 16 fl. oz. = _____ pt.
23. 12 qt. = _____ gal.
24. 8 pt. = _____ qt.
25. 12 tsp. = _____ tbsp.
26. 64 fl. oz. = _____ qt.
27. 40 pt. = _____ gal.
28. 56 c. = _____ qt.
29. 48 tsp. = _____ c.
30. 16 c. = _____ gal.
31. 24 pk. = _____ bu.
32. 64 qt. = _____ pk.
33. 36 pt. = _____ qt.
34. 60 units = _____ doz.
35. 32 pt. = _____ pk.
36. 96 qt. = _____ bu.
37. 384 pt. = _____ bu.
38. 6 units = _____ doz.
39. 16 qt. = _____ pk.
40. 224 qt. = _____ bu.



ASSIGNMENT SHEET 4

name _____ **score** _____

objective 11

CONVERT UNITS OF WEIGHT MEASUREMENT.

Equipment list
• calculator
• pencil

INSTRUCTIONS

Write your answers in the spaces provided.

Part 1—Convert weight measurements from larger to smaller units

1. 3 lb. = _____ oz.
2. 4 tn. = _____ lb.
3. 1 lb. 2 oz. = _____ oz.
4. 1 tn. 800 lb. = _____ lb.
5. 6 lb. 5 oz. = _____oz.
6. 15 lb. = _____ oz.
7. 1 tn. = _____ oz.
8. 5 lb. 7 oz. = _____ oz.
9. 3 tn. 200 lb. = _____ lb.
10. 2 tn. 100 lb. = _____ oz.

Part 2—Convert weight measurements from smaller to larger units

11. 32 oz. = _____ lb.
12. 6,000 lb. = _____ tn.
13. 54 oz. = _____ lb. _____ oz.
14. 32,000 oz. = _____ tn.
15. 6270 lb. = _____ tn. _____ lb.
16. 36 oz. = _____ lb. _____ oz.
17. 8 oz. = _____ lb.
18. 15,270 lb. = _____ tn. _____ lb.
19. 64,800 oz. = _____ tn. _____ lb.
20. 96 oz. = _____ lb.

ASSIGNMENT SHEET 5

name _____ **score** _____

objective 13

CALCULATE MEASUREMENTS OF VOLUME USING ADDITION AND SUBTRACTION.

Equipment list

- pencil

INSTRUCTIONS

Write your answers in the spaces provided. Express your answers in the simplest form.

Part 1—Add volume measurements

1.

2 qt. 1 pt.
+ 4 qt. 1 pt.

2.

6 bu. 2 pk.
+ 4 bu. 3 pk.

3.

5 tbsp. 2 tsp.
+ 7 tbsp. 2 tsp.

4.

1 c. 9 tbsp.
+ 1 c. 10 tbsp.

5.

2 gal. 3 qt.
1 gal. 2 qt.
+ 3 gal. 3 qt.

6.

3 qt. 1 pt.
2 qt. 1 pt.
+ 4 qt. 1 pt.

7.

2 gal. 3 qt. 1 pt.
+ 3 gal. 2 qt. 1 pt.

8.

1 c. 1 tbsp. 1 tsp.
1 c. 2 tbsp. 2 tsp.
+ 2 tbsp. 2 tsp.

9.

2 qt. 1 pt. 1 c.
4 qt. 1 pt. 1 c.
+ 6 qt. 1 pt. 1 c.

10.

7 bu. 2 pk. 5 qt.
8 bu. 3 pk. 4 qt.
+ 1 bu. 2 pk. 3 qt.

Part 2—Subtract volume measurements

11.

3 qt. 1 pt.
– 2 qt. 0 pt.

12.

8 gal. 3 qt.
– 4 gal. 2 qt.

13.

3 bu. 0 pk.
– 1 bu. 2 pk.

14.

1 c. 5 tbsp.
– 8 tbsp.

15.

4 gal. 3 qt. 0 pt.
– 2 gal. 1 qt. 1 pt.

16.

8 bu. 2 pk. 0 qt.
– 1 bu. 3 pk. 1 qt.

17.

1 c. 8 tbsp. 1 tsp.
– 9 tbsp. 2 tsp.

18.

3 pk. 6 qt. 0 pt.
– 2 pk. 7 qt. 1 pt.

19.

3 qt. 0 c.
– 1 qt. 1 c.

20.

1 pt. 4 tbsp.
– 12 tbsp.

ASSIGNMENT SHEET 6

name _____ **score** _____

objective 14

CALCULATE MEASUREMENTS OF WEIGHT USING ADDITION AND SUBTRACTION.

Equipment list

- pencil

INSTRUCTIONS

Write your answers in the spaces provided. Express your answers in the simplest form.

Part 1—Add weight measurements

1.

	5 lb.	10 oz.
+	2 lb.	8 oz.

2.

	7 lb.	7 oz.
+	6 lb.	6 oz.

3.

	2 tn.	1200 lb.
+	9 tn.	800 lb.

4.

	4 lb.	8 oz.
+	3 lb.	9 oz.

5.

	1 lb.	4 oz.
	8 lb.	7 oz.
+	5 lb.	6 oz.

6.

	6 tn.	600 lb.
	3 tn.	900 lb.
+	5 tn.	800 lb.

7.

	9 tn.	80 lb.	10 oz.
+	2 tn.	40 lb.	15 oz.

8.

	1 tn.	1500 lb.	5 oz.
		499 lb.	7 oz.
+			4 oz.

9.

	12 tn.	50 lb.	3 oz.
	20 tn.	200 lb.	11 oz.
+	45 tn.	325 lb.	1 oz.

10.

	14 tn.	0 lb.	14 oz.
	6 tn.	450 lb.	12 oz.
+	1 tn.	550 lb.	10 oz.

Part 2—Subtract weight measurements

11.

	15 tn.	40 lb.
–	10 tn.	20 lb.

12.

	7 lb.	14 oz.
–	6 lb.	10 oz.

13.

	23 tn.	525 lb.
–	16 tn.	375 lb.

14.

	9 tn.	0 lb.
–	2 tn.	400 lb.

15.

	8 lb.	2 oz.
–	7 lb.	15 oz.

16.

	40 lb.	3 oz.
–	29 lb.	9 oz.

17.

	7 tn.	380 lb.	4 oz.
–	5 tn.	528 lb.	7 oz.

18.

	25 lb.	5 oz.
–		6 oz.

19.

	3 tn.	2 oz.
–	1 tn.	10 oz.

20.

	4 tn.	0 lb.	0 oz.
–			1 oz.

ASSIGNMENT SHEET 7

name _____ **score** _____

objective 15

SOLVE WORD PROBLEMS INVOLVING VOLUME AND WEIGHT MEASUREMENTS.

Equipment list
• calculator
• pencil

INSTRUCTIONS

Write your answers in the spaces provided. Show your work.

1. Jane is preparing baked cheese fondue. The recipe calls for 1 cup of grated cheddar cheese to make 4 servings. Jane needs enough to make 6 servings. How much total cheese does Jane need?

2. A water faucet drips about 10 mL of water each minute. How many tablespoons does it drip each hour?

3. A liter of water weighs 1 kilogram. How much does 683 mL of water weigh?

4. A trucking company uses 2 pints of oil in each of its 6 trucks each month. How many gallons of oil does the company use each year?

5. The club needed 5 bushels of apples to make apple butter. Only 3 pecks were available when they started. How many more pecks do they need to have 5 bushels?

6. Mike is preparing an ammonium solution. The directions state that 4 tablespoons of ammonia should be added to 1 gallon of water. Mike is using a bucket that only holds 2 quarts of water. How much ammonia should he add?

7. To mail a letter first class, the post office charges $0.37 for the first ounce, and $0.23 for each additional ounce or fraction of an ounce. If John needs to mail a letter that weights 57 grams, how much will he have to pay for postage?

8. One stick of butter equals ½ cup. If Jay needs 12 tablespoons of butter for the recipe he is preparing, how many sticks of butter will he need?

9. A semi truck that weighs 4 tons 400 pounds and carrying a load that weighs 18,300 kilograms approaches a bridge. A sign indicates that the bridge can hold 22 tons. Can the truck safely cross the bridge?

10. An 18 lb. bag of fertilizer costs $24.99 and a 58 oz. bag of the same fertilizer costs $7.49. Which bag offers the better deal?

ASSIGNMENT SHEET ANSWERS

ASSIGNMENT SHEET 1

PART 1

1. 14.79 mL
2. 1183 mL
3. 8.808 L
4. 7.568 L
5. 37.85 L
6. 0.2072 L
7. 7.57 L
8. 4720 mL
9. 3.306 L
10. 2.838 L

PART 2

11. 4.22 liquid pt.
12. 3.632 dry pt.
13. 0.812 tsp.
14. 236.6 fl. oz.
15. 2.642 gal.
16. 6.09 tsp.
17. 16.912 liquid qt.
18. 14.528 dry qt.
19. 676 fl. oz.
20. 1.321 gal.

ASSIGNMENT SHEET 2

PART 1

1. 141.75 g
2. 2721.54 kg
3. 4.077 kg
4. 567 g
5. 0.906 kg

PART 2

6. 8.82 lb.
7. 0.11 tn.
8. 0.07 oz.
9. 1.4 oz.
10. 26.46 lb.

ASSIGNMENT SHEET 3

PART 1

1. 16 pt.
2. 112 fl. oz.
3. 8 qt.
4. 144 tsp.
5. 224 tbsp.
6. 32 fl. oz.
7. 32 pt.
8. 8 c.
9. 160 tbsp.
10. 768 tsp.
11. 4 c.
12. 40 qt.
13. 40 pk.
14. 24 units
15. 144 pt.
16. 128 pt.
17. 192 tsp.
18. 48 c.
19. 6 units
20. 96 qt.

PART 2

21. 6 pt.
22. 1 pt.
23. 3 gal.
24. 4 qt.
25. 4 tbsp.
26. 2 qt.
27. 5 gal.
28. 14 qt.
29. 1 c.
30. 1 gal.
31. 6 bu.
32. 8 pk.
33. 18 qt.
34. 5 doz.
35. 2 pk.
36. 3 bu.
37. 6 bu.
38. ½ doz.
39. 2 pk.
40. 7 bu.

ASSIGNMENT SHEET 4

PART 1

1. 48 oz.
2. 8,000 lb.
3. 18 oz.
4. 2,800 lb.
5. 101 oz.
6. 240 oz.
7. 32,000 oz.
8. 87 oz.
9. 6,200 lb.
10. 65,600 oz.

PART 2

11. 2 lb.
12. 3 tn.
13. 3 lb. 6 oz.
14. 1 tn.
15. 3 tn. 270 lb.
16. 2 lb. 4 oz.
17. ½ lb.
18. 1 tn. 1,270 lb.
19. 2 tn. 50 lb.
20. 6 lb.

ASSIGNMENT SHEET 5

PART 1

1. 7 qt.
2. 11 bu. 1 pk.
3. 13 tbsp. 1 tsp.
4. 3 c. 3 tbsp.
5. 8 gal.
6. 14 qt. 1 pt.
7. 6 gal. 2 qt.
8. 2 c. 6 tbsp. 2 tsp.
9. 14 qt.
10. 18 bu. 4 qt.

PART 2

11. 1 qt. 1 pt.
12. 4 gal. 1 qt.
13. 1 bu. 2 pk.
14. 13 tbsp.
15. 2 gal. 1 qt. 1 pt.
16. 6 bu. 2 pk. 7 qt.
17. 14 tbsp. 2 tsp.
18. 6 qt. 1 pt.
19. 1 qt. 3 c.
20. 1 c. 8 tbsp.

ASSIGNMENT SHEET 6

PART 1

1. 8 lb. 2 oz.
2. 13 lb. 13 oz.
3. 12 tn.
4. 8 lb. 1 oz.
5. 15 lb. 1 oz.
6. 15 tn. 300 lb.
7. 11 tn. 121 lb. 9 oz.
8. 2 tn.
9. 77 tn. 575 lb. 15 oz.
10. 21 tn. 1002 lb. 4 oz.

PART 2

11. 5 tn. 20 lb.
12. 1 lb. 4 oz.
13. 7 tn. 150 lb.
14. 6 tn. 1600 lb.
15. 3 oz.
16. 10 lb. 10 oz.
17. 1 tn. 1851 lb. 13 oz.
18. 24 lb. 15 oz.
19. 1 tn. 199 lb. 8 oz.
20. 3 tn. 1999 lb. 15 oz.

ASSIGNMENT SHEET 7

1. 1 ½ c. or 1 c. 8 tbsp.
2. 40.6 tbsp.
3. 1.46 g
4. 18 gal.
5. 7 pk.
6. 2 tbsp.
7. $0.60
8. 1 ½ stick
9. No. The total weight of the truck is 24.33 tons
10. 18 lb. bag is the better deal; 18 lb. bag is $0.087 per oz., the 58 oz. bag is $0.13 per oz.

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