



[Introduce yourself to your class]



## Professional Standards Addressed

- Nutrition (1000)
  - Menu Planning (1100)
    - Write standardized recipes, and use Food Buying Guide (1140)
- Operations (2000)
  - Food Production (2100)
    - Understand and effectively prepare food using a standardized recipe (2110)
    - Complete a food production record and other required paperwork (2120)
    - Properly use and care for equipment (2140)
  - Serving Food(2200)
    - Identify/serve portions of food items according to USDA school meal patterns requirements and diet restrictions.(2210)

<http://healthymeals.nal.usda.gov/hsmrs/ProfStandards/learningobjectivescodes.pdf>

Under the USDA's new professional Standards requirements, this training will cover items that support learning in these professional standards objectives.



# Kitchen Math

## *Weights & Measures*

### **Objectives**

- Identify weights and measures (volume) units and tools
- Differentiate between “ounces” and “fluid ounces”
- Recognize when to use weight and when to use volume
- Know how to do a simple yield study

Let's review the objectives of today's training– (read slide)



## Weights & Measures

Recipes can indicate the amount of each ingredient in two ways.... Weight and volume



Read slide



# Weights & Volume

## Weight



Pound, ounce, *gram*,  
*kilogram*

## Volume



Cup, pint, quart, gallon,  
fluid ounce, teaspoon,  
Tablespoon, *milliliter*,  
*liter*

I-5

Just to review, you will know the recipe calls for weight or volume by the units. Pounds, grams, ounces or kilograms is weight. This is measured using a scale. Cups, pints, quarts, gallons, fluid ounces or liters is volume. This is measured by filling a container.



Recipe: 500133 OATMEAL MUFFIN SQUARES  
Recipe Source: USDA B-20  
Recipe Group: BREAD/ROLLS/STARCH

Alternate Recipe Name:  
Number of Portions: 50  
Size of Portion: SERVINGS

020038 OATS.....	8 OZ
014429 WATER,MUNICIPAL.....	3 1/2 CUP
020081 WHEAT FLR,WHITE,ALL-PURPOSE,ENR,BLEACHED...	1 LB + 3 OZ
018372 LEAVENING AGENTS,BAKING SODA.....	1 1/4 TSP
002010 CINNAMON,GROUND.....	1 1/4 TSP
002025 NUTMEG,GROUND.....	1 1/4 TSP
002047 SALT,TABLE.....	1 1/4 TSP
799915 MARGARINE,REG,HARD,SOYBN (HYDR)&CTTNSD.....	6 OZ
019334 SUGARS,BROWN.....	1 LB + 2 OZ
019335 SUGARS,GRANULATED.....	1 LB + 2 OZ
002050 VANILLA EXTRACT.....	2 1/2 TSP
001124 EGG,WHITE,RAW,FRSH.....	7 large
001117 YOGURT,PLN,LOFAT,12 GRAMS PROT PER 8 OZ.....	1/4 CUP
799900 APPLESAUCE,CND,UNSWTND,W/ VIT C.....	1/4 CUP, sauce
020038 OATS.....	3 OZ
020081 WHEAT FLR,WHITE,ALL-PURPOSE,ENR,BLEACHED...	1/4 CUP
019334 SUGARS,BROWN.....	1/4 CUP, packed
799915 MARGARINE,REG,HARD,SOYBN (HYDR)&CTTNSD.....	1/4 CUP

Which are  
volume?

Which are  
weight?

*Note to presenter: This slide has animation to identify weights in green and volumes in red. Animation will advance with each click. Ask your class before you click. (Eggs were ignored because they are measured per item.)*

Let's look at a recipe-- start at the top-- 8 oz-- weight or volume?



# Ounces!

*Who named these units anyway?*

## **WEIGHT:**

Ounce  
Oz.



16 oz of beef = 1 pound

## **VOLUME:**

Fluid Ounce  
Fl. Oz



8 fl. oz of milk = 1 cup

THIS IS A COMMON AREA OF CONFUSION

**NOTE TO PRESENTER— SPEND AS MUCH TIME AS YOU NEED ON THIS SLIDE UNTIL THIS POINT IS CLEARLY UNDERSTOOD.**

We have an unfortunate situation in measuring using the English system, and that is that the word OUNCES is used in both a volume and a weight measurement. How do you tell the difference??

In the old days, we called the weight ounce the “Avoirdupois ounce”. Now we just call it “ounce” (thank goodness!) so 16 ounces is 1 pound.

If it says “FLUID ounces” or “fl. oz.” It’s volume, like 8 Fluid ounces of milk is one cup.

*Check for understanding, then ask.* What are some suggestions on how to make this clear in your school kitchen?

For clarity, you can

1. Use cups/pints/quarts instead of fluid ounces
2. Use the metric system (grams, milliliters) and avoid ounces altogether in recipes. (Downside: USDA programs don’t use metric)
3. Quick training idea for staff using a light and a heavy substance of similar volume. For example: Compare 8 fluid ounces of lettuce verses 8 fluid ounces of milk. Do they weigh exactly 8 weight ounces? Do they weigh the same?



## ALL ABOUT VOLUME



## VOLUME: Liquids

Use volume to measure liquid ingredients and other ingredients in amounts less than two ounces (4 tablespoons).

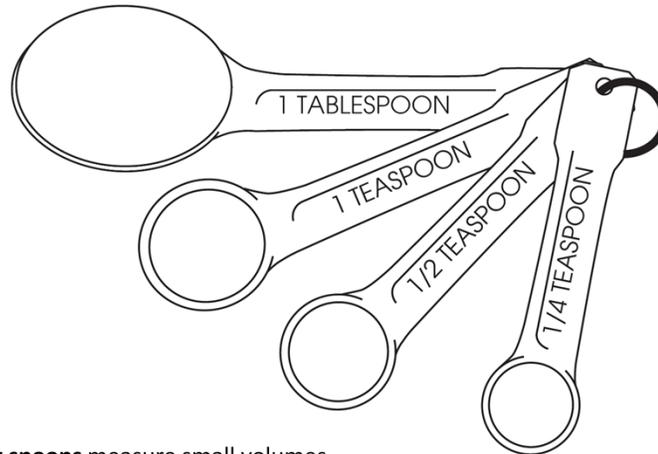
### Volume Measures

- milliliter
- teaspoon
- tablespoon
- fluid ounce
- cup
- pint
- quart
- gallon

*Read slide*



## VOLUME: Tools



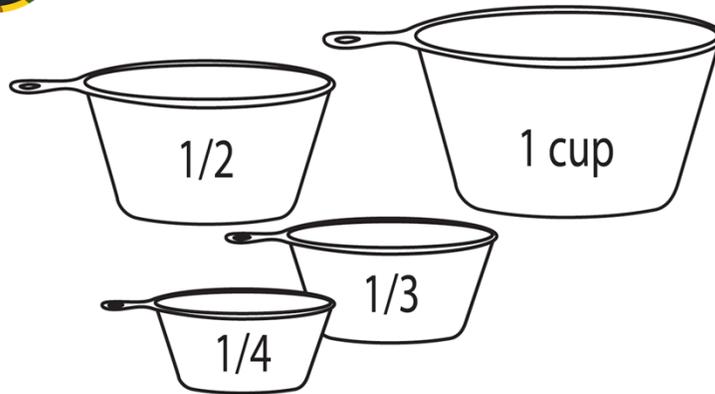
**Measuring spoons** measure small volumes

Visual 10

Measuring spoons are used for small volumes. In the US we use teaspoons & tablespoons.... In most of the rest of the world, they use milliliters. For easy conversion, a teaspoon is about 5 milliliters, (4.93, actually) so a Tablespoon is about 15 ml (14.79)



## VOLUME: Tools



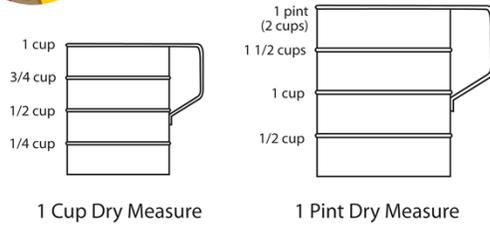
Use flat-topped **measuring cups** to measure dry ingredients by volume

Visual 11

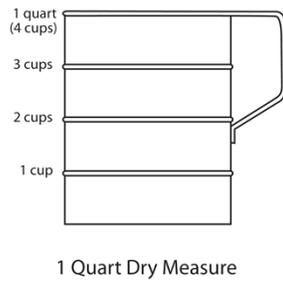
Nesting cups are dry measure equipment. The reason they have flat tops is so you can even them out to get an exact measure.



## VOLUME: Tools



**Graduated dry measures** have a flat top, but also have visual measures along the sides.



Visual 12

Dry measures come in cup, pint and quart sizes.



## VOLUME: Dry Ingredients

- Spoon into the container
- Level off the top

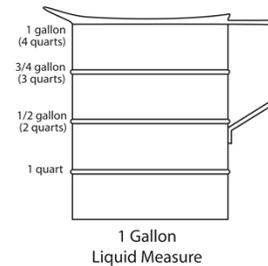
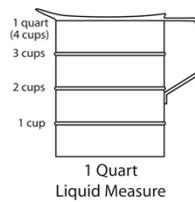
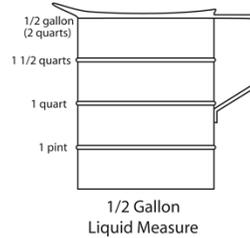
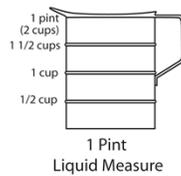
*NOTE TO PRESENTER--EQUIPMENT NEEDED-- DRY MEASURE AND SOMETHING TO MEASURE:*

Demonstrate proper technique for measuring dry ingredients this for the class. Use measuring cup, straight edge and sugar or flour. If you have time, bring a volunteer up to the front to demonstrate this instead.



# VOLUME: Tools

**Graduated Liquid Measures** have a pouring lip instead of a flat top. They can be clear, so you can read them from a flat surface, or ringed, so you look down into the measure to see the liquid level.



Visual 14

Liquid measures are either clear, which you place on level surface to read, or ringed and you look down into the measure to see the liquid level.

Demonstrate proper technique for liquid measuring by using water (or colored water for more visual clarity) by filling a liquid measure to the line and reading.



## VOLUME: Liquid Ingredients

- Pour into container
- Visually identify the liquid surface at the appropriate line
  - If clear, go to eye level and read from the outside
  - If opaque, visualize level inside container

*NOTE TO PRESENTER --EQUIPMENT --REQUIRES LIQUID MEASURE AND WATER:*

Demonstrate this with both a clear container and an opaque container. Bring a volunteer up to “eyeball” your volume measure. For smaller volumes, when reading a clear container, look at the bottom of the meniscus to read the volume, not the level around the edges of the container.



## VOLUME: Tools (serving)

### Scoops (Dishers)

Size/No.¹	Level Measure
6	2/3 cup
8	1/2 cup
10	3/8 cup
12	1/3 cup
16	1/4 cup
20	3-1/3 Tbsp
24	2-2/3 Tbsp
30	2 Tbsp
40	1-2/3 Tbsp
50	3-3/4 tsp
60	3-1/4 tsp
70	2-3/4 tsp
100	2 tsp

The size of a scoop indicates the number of portions per quart.



I-16

Scoops are also called dishers. These measure volume, and should be thought of as a measuring cup used for serving. Just like any measuring tool, care needs to be taken to insure an accurate measure. A heaping scoop will be a different volume than a level amount. Using a heaping scoop can reduce the number of servings you can get out of a recipe, so you run out earlier than anticipated. For dishers that are standardized to US measurements, the disher number indicates how many of the scoops are needed to make a quart. The larger the number, the smaller the scoop size.

Ask “What scoop number of disher/scoop do I need for a ½ cup serving? (Assuming US measure standardization, not metric)



## VOLUME: Tools (serving)



Ladle fl oz	Approx. Measure	Portion Server fl oz
1 oz	1/8 cup	1 oz
2 oz	1/4 cup	2 oz
3 oz	3/8 cup	3 oz
4 oz	1/2 cup	4 oz
6 oz	3/4 cup	6 oz
8 oz	1 cup	8 oz
12 oz	1-1/2 cups	—

Ladles and portion servers (measuring-serving spoons that are volume-standardized) are labeled "oz." "Fl oz" would be more accurate since they measure volume, not weight.

Use ladles for serving soups, stews, creamed dishes, sauces, gravies, and other liquid products.

Use portion servers (solid or perforated) for portioning solids and semi-solids such as fruits and vegetables, and condiments.

The size of a ladle or spoodle is written as oz, but it measures **FLUID OUNCES**

I-17

Ladles are also volume measures. They measure **fluid** ounces even though only "oz" is often marked.

This chart gives fluid ounce to cup size for ladles. Spoodles are combination of a spoon and a ladle. They allow for more volume control, but with the convenience of a spoon-like utensil. They are usually marked by the volume they hold in fluid ounces also.

Ask— If I want to give a half cup serving in my spoodle or ladle— which size would I use? (4 fluid ounce)



## VOLUME: Tips

Always measure ingredients in the largest appropriate container.

\* What is the exception? Why?



*Animation: Flour image will come in on click.*

The exception to this rule is flour – don't measure volumes larger than 1 quart because flour can easily pack.



To presenter, if necessary, this is an appropriate time to take a quick break.



## Weight: Tools

Digital Scale: Small sizes

2 oz meat



Ask the class how many have a scale like this in their kitchen? Who uses it?

*NOTE TO PRESENTER— EQUIPMENT NEEDED- SMALL SCALE: Show the digital scale*



## Weight: Tools

Traditional Scale: Heavier weights 2 - 50 lbs.

Baking – 7.5# of Whole Wheat Flour



Ask – How many have a scale like this in their kitchen? Who uses it?  
(This scale actually measures in kilograms. Typically, in the US, you will have one that measures pounds.)



## Weight: Proper Technique

Tare (zero- out) the scale

- Can tare with the container
  - Place the container for the ingredient on the platform.
  - Be sure the pointer is on zero when you begin.

*NOTE TO PRESENTER: EQUIPMENT NEEDED- SCALE:* Demonstrate the taring and measuring technique to the participants with both the digital and mechanical scale. Measure something using both scales. If you have time, bring up a volunteer and walk him/her through the procedure of taring and weighing.



(this is a visual cue that you are switching topic– no content)



## Weight Verses Volume

- Weighing is faster
- Weighing is more accurate
- Weighing requires a kitchen scale
- Volume uses common tools
- In U.S. home recipes, volume is more common

What is the difference between using weights or measures in cooking?

(read slide)



## The Meal Pattern: Weight vs Volume

### MEASURE WEIGHT

Meats  
Cheese  
Nuts & Seeds  
Grains\*



\*Exhibit A, Groups A-G use weight, Groups H & I can use either weight or volume.

### MEASURE VOLUME

Fruits & Vegetables  
• including legumes used as M/MA  
Nut butters (peanut butter)  
Yogurt  
Cooked pasta (H)\*  
Cooked oats/rice (H)\*  
Ready to eat cereal (I)\*  
Milk



When measuring for school meals, the meal patterns requires weight for meats, cheese, nuts and seeds.

For Grains, we use exhibit A. For most grains it is weight (ounces), but for cooked pastas, cooked grains like rice or oats, and ready to eat cereal, we can use volume or weight.

*Question you may encounter: Are we required to measure each serving of meat? No. It helps weigh out one serving to keep on display during service to serve as a frame of reference. This reduces over-portioning, or under portioning. (FYI --If you are using a meat product with extra ingredients, check the CN label to be sure that you are measuring one ounce equivalent for the product you are using. Common example– lunch meat with .84 ounces of meat per ounce, you would measure out 1.2 ounces per serving to credit 1 ounce.)*

When we measure fruits and vegetables **for serving** measure in volume. (For purchasing, we often have to convert to weight– see Food Buying Guide) We also use volume for peanut butter, yogurt, and milk.





## Production Records: Weight or Volume

10. Food/Menu Items	11. Recipe/Product Reference #	12. Planned Portion Size (by grade groups)			13. Meat/Meat Alternate Equivalents	14. Grains/Breads Equivalents	15. Fruit Equivalents	16. Vegetable Equivalents	17. Planned # Servings to be Prepared	18. Planned quantity of food to be used	19. Actual # Servings Prepared
		K-5	6-8	9-12							
Chicken- Fajita meat		2 oz			2				100	12.5#	
Tortilla WGR		2 oz				2			100	12.5#	
Apple Slices		1/2 c				1/2			100	50 c	
Green pepper slices		1/4 C					0.25		100	25 c	
Red pepper slices		1/4 C					0.25		100	25 c	
Onion slices		1/4 C					0.25		100	25 c	

*This slide has animation— get responses from the group prior to advancing slides.*

Okay, let's try this example of chicken fajitas. (click) We'll do 100 servings of each item for simplicity.

What measure is used for meat/meat alternate? (click click) Weight— a serving size is in ounces, and the preparation quantity will be in pounds (click)

What measure is used for grains? (click click) Weight— a serving size is in ounces, and the preparation quantity will be in pounds (click) Some grains can be measured with volume— refer to Exhibit A for those conversions.

What measure is used for fruits (click, click) Volume— a serving size is in cups or fractions of cups. The preparation quantity will be either in cups or a larger volume measurement, such as gallons.

What measure is used for vegetables (click click)? Volume— a serving size is in cups or fractions of cups. The preparation quantity will be either in cups or a larger volume measurement, such as gallons.

As we often ORDER fruits and vegetables in pounds, the Food Buying Guide usually has those conversion factors.



## Weight Verses Volume

- Some recipes do not show both volume and weight.
- If conversion factors between weight and volume are in the Food Buying Guide, you can use them.

### Section 2 - Vegetables – Red/Orange Subgroup

1. Food As Purchased, AP	2. Purchase Unit	3. Servings Per Purchase Unit, EP	4. Serving Size per Meal Contribution	5. Purchase Units for 100 Servings	6. Additional Information
Carrots, fresh <i>Baby</i> <i>Ready-to-use</i>	Pound	12.90	1/4 cup raw vegetable	7.8	1 lb AP= 1 lb (about 3-1/8 cups) ready-to-serve raw carrots
	Pound	11.40	1/4 cup cooked, drained vegetable	8.8	1 lb AP= 0.97 lb (about 2-3/4 cups) cooked carrots

If there is a conversion factor you can use between weight and volume, it will be in Food Buying Guide under the food item. Here is an example for baby carrots– 1 lb equals about 3 1/8 cups.



## Weight Verses Volume: Yield Study

1. Measure the volume of a pre-weighed package
2. Check at least 6 packages
3. Best if done by more than one person
4. Keep your data

Yield Study		
XYZ Brand Salad Mix, 5 # bag		
Date	Who?	Volume in cups
8-Jan	Maria	20 1/4
10-Jan	Beth	17 3/4
12-Jan	Beth	19 3/4
15-Jan	Kim	18 1/2
17-Jan	Maria	17 3/4
19-Jan	Kim	19 1/2
Average		19

If it isn't listed in the food buying guide then you may have to verify a weight to volume conversion for the product and keep documentation of what you found. This is called a yield study. When you do a yield study, identify the package size you purchase, (Example 5# of salad mix) measure by volume at least 6 different packages. It is ideal if all the measurements are not by same person. This doesn't have to be on the same day— just the next 6 packages that you open, you volume measure and record. Track your results and average them. Keep this data— you can put it in your Food Buying Guide or another safe place so you do not have to do another yield study.

*Note to the presenter: If you choose to go into further detail, see pages I-3 and I-4 of the Food Buying Guide for conducting a yield study)*

*One example that is common is leafy green vegetables. Sometimes the package will state 1 serving is 85 grams, but it doesn't list a volume for that serving. How do I determine the volume of 85 grams of greens? Weigh then measure without crushing. (May vary from 1/2 cup to 4 cups, depending on variety and the size of chop)*

In an Administrative Review, you may be asked to prove your weight to volume conversion factors. Keeping records of your yield study meet that requirement. Some people will add their yield study page to their Food Buying Guide binder to keep it in a logical place



# Meats in the Food Buying Guide

Section 1-Meat/Meat Alternates					
1. Food As Purchased, AP	2. Purchase Unit	3. Servings Per Purchase Unit, EP	4. Serving Size per Meal Contribution	5. Purchase Units for 100 Servings	6. Additional Information
<b>Beef, Ground, fresh or frozen<sup>7,8</sup></b> <i>no more than 20% fat</i> <i>Includes USDA Foods</i> <i>(Like IMPS #136)</i>	Pound	11.80	1 oz cooked lean meat	8.5	1 lb AP = 0.74 lb cooked, drained lean meat
	Pound	7.89	1-1/2 oz cooked lean meat	12.7	
<b>Beef, Ground, fresh or frozen<sup>7,8</sup></b> <i>no more than 15% fat</i> <i>(Like IMPS #136)</i>	Pound	12.00	1 oz cooked lean meat	8.4	1 lb AP = 0.75 lb cooked, drained lean meat
	Pound	8.00	1-1/2 oz cooked lean meat	12.5	

When working with raw meats in the food buying guide, realize that a raw pound does not equal a cooked pound. There is loss in weight when you drain off the fat and lose moisture from steam. The meal pattern is in ounces of COOKED meat, not raw meat. When you are cooking from raw meat, check the food buying guide to see the factor to use in converting raw meat to cooked meat. In this entry of the food buying guide, 1 pound of 85-15 ground beef will result in .75 lbs of cooked meat.



10. Food/Menu Items	11. Recipe/Product Reference #	12. Planned Portion Size (by grade groups)			13. Meat/Meat Alternate Equivalents	14. Grains/Breads Equivalents	15. Fruit Equivalents	16. Vegetable Equivalents	17. Planned # Servings to be Prepared	18. Planned quantity of food to be used	19. Actual # Servings Prepared
		K-5	6-8	9-12							
Ground beef, (cooked servings)		2 oz			2 oz				100	16 2/3 # raw	

**So, on your production record, if preparing 100 servings and every student is to receive 2 ounces of cooked ground beef, how much would your raw meat preparation weight be?**

2 ounces x 100 serving = 200 ounces

Convert 200 ounces to lbs.  $200/16 = 12.5$  # of cooked meat is needed.

$.75 \times (\text{raw meat in \#}) = 12.5\#$  cooked

$12.5/.75$  or **16.66 lbs** of raw ground beef

1 pound of 85-15 ground beef will result in .75 lbs of cooked meat.

So, on your production record, if preparing 100 servings and every student is to receive 2 ounces of cooked ground beef, how much would your raw meat preparation weight be?

(click) 2 oz each of cooked meat x 100 servings = 200 ounces of cooked meat

(click) Convert 200 oz to lbs.  $200/16 = 12.5$  # of cooked meat is needed.

(Click) Equation  $.75 \times (\text{raw meat in \#}) = 12.5\#$  or

(click) raw meat in lbs =  $12.5/.75$  or (click) 16.66 lbs.

This same technique can be used for meat products that contain extra ingredients or fillers. For example, if you have a lunchmeat product that contains 0.84 meat per ounce, you would need to serve 1.2 ounces to get one ounce of crediting. If you are using a meat product with extra ingredients, check the CN label to be sure that you are measuring one ounce equivalent for the product you are using.



## How much is in a #10 can?

- 108 oz applesauce
- 111 oz mashed banana
- 105 oz canned pears
- 103 oz raspberries
- 102 oz cherries

*Are these fluid ounces  
or weight ounces?  
Can you tell?*



Here is a thinking question about weight and volume:

I have several fruit cans in my store room. They are all the same size-- #10 cans. The labels list these measurements for each item. Are these measurements in weight ounces or in fluid ounces? How can you tell?

[Cadre-- #10 cans are typically in weight ounces, with the exception of fruit juices, which may be labeled "96 fluid ounces". You should be able to tell because the volume of the can remains the same, but the ounces differ-- which means they vary by their density. Because these are weight ounces, please rely on the Food Buying Guide for School Meal programs to determine the servings per can in volume, especially if you are draining the liquid.]



(this is a visual cue that you are switching topic– no content)



## Try It yourself!

- Weights and Measures Instructions and Results Recording Sheet
- Follow instructions
- Record your answers
- Work quickly and neatly
- Be prepared to report what you discovered

We're going to try this in stations--- Your workbook has activities to be done at each station.



## Measuring Practice Stations

1. Understanding Ounces
2. Sugar
3. Flour
4. Water
5. Ground Beef
6. Lettuce

Allow for no more than 4 minutes per station. If a group finishes early, have a different member of the group try it and see if their results are consistent. Allowing 25 minutes will allow for each group to do each station, with one minute to get back to their spots. (Add time if doing the optional Station 7)

## Optional 7<sup>th</sup> station

Practice weighing multiple ingredients

- Tare a scale with container
- Add  $\frac{1}{2}$  lb of flour
- Retare the scale without removing flour
- Add a 2<sup>nd</sup>  $\frac{1}{4}$  lb of flour

Typically, this would be two different ingredients, but to avoid mixing items, use flour for both.



Return for discussion in 25 minutes



## Station 1: Marshmallows & Beans

16 fluid ounces marshmallows = \_\_\_\_\_ oz (weight)

16 fluid ounces of legumes = \_\_\_\_\_ oz (weight)



I-38

*Ask the participants about their results.*

After this exercise, is everyone convinced that fluid ounces (volume) are different than weight ounces? Same volume, different weights.

Which takes up more space (volume), a pound of feathers or a pound of rocks? The feathers of course, but they weigh the same. Different volume, same weight.



## Station 2: Sugar

- Was there a variation in weights between the measuring method?
- Why?
- Which method took longer?
- Which used less math?



I-39

*Ask the participants about their results.*



## Station 3: Flour

- Did the two measuring techniques result in different weights? Why?
- Based on this activity, why do you think professional bakers prefer to use weights in their recipes?
- Compare the proper technique for flour versus the proper technique for brown sugar.



I-40

*Ask the participants about their results.*



## Station 4: Water

- How easy was it to get a perfectly level liquid measure in the dry measure cup?
- Which was easier to maneuver to the bowl?



I-41

*Ask the participants about their results.*

After this exercise, is everyone convinced that fluid ounces (volume) are different than weight ounces? Same volume, different weights.

Which takes up more space (volume), a pound of feathers or a pound of rocks? The feathers of course, but they weigh the same. Different volume, same weight.



## Station 5. Ground Beef

- Was there a difference in weight? Why?
- When I drain off the fat, what will happen? What if I used higher fat meat like 70/30?
- 2 oz cooked portion verses 2 oz raw portion
- Yield Conversion Resource?
  - The Food Buying Guide for School Nutrition Programs



*Ask the participants about their results.*



# Station 5 Ground Beef

Section 1-Meat/Meat Alternates					
1. Food As Purchased, AP	2. Purchase Unit	3. Servings Per Purchase Unit, EP	4. Serving Size per Meal Contribution	5. Purchase Units for 100 Servings	6. Additional Information
<b>BEEF, GROUND fresh or frozen<sup>6, 7, 8</sup></b>					
<b>Beef, Ground, fresh or frozen Market Style<sup>6, 8</sup> no more than 30% fat (Like IMPS #136)</b>	Pound	11.20	1 oz cooked lean meat	9.0	1 lb AP = 0.70 lb cooked, drained, lean meat
	Pound	7.46	1-1/2 oz cooked lean meat	13.5	
<b>Beef, Ground, fresh or frozen<sup>7, 8</sup> no more than 15% fat (Like IMPS #136)</b>	Pound	12.00	1 oz cooked lean meat	8.4	1 lb AP = 0.75 lb cooked, drained lean meat
	Pound	8.00	1-1/2 oz cooked lean meat	12.5	

I -43

Ask the participants about their results.

If you have to purchase a higher fat meat, you'll need more raw weight meat to insure you meet the required amount to be served. Here's the entry for ground beef in the food buying guide. Use the conversion factor listed here to convert raw to cooked.



## Station 6: Lettuce

- What information is missing?
- Where could you get this information?
  - Label
  - Food Buying Guide for School Meal Programs
  - A yield study
- How consistent were your lettuce weights?
- Why do you think a yield study is done on at least 6 containers?



*Ask the participants about their results.*



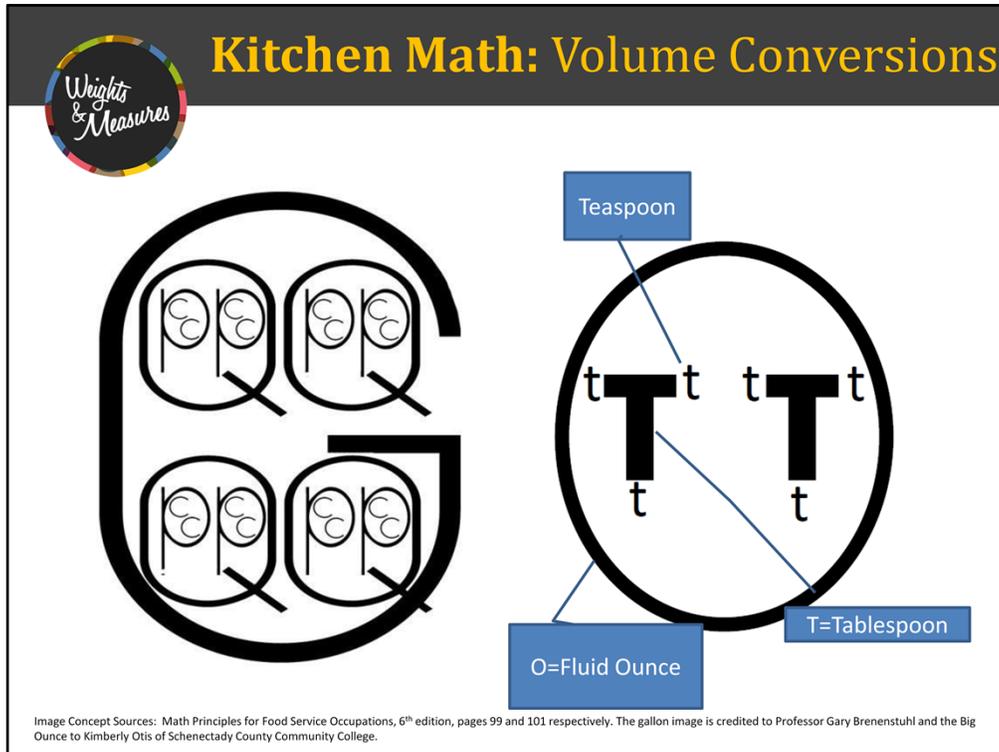
## Station 7: Practice weighing

- How difficult was it to measure then re-tare to get the next ingredient
- Do you think this technique would speed up or slow down the process of baking from scratch?

*Ask the participants about their results.*



We're going to go over a few charts that are available. If one or more of them would be useful in your kitchen, consider putting it in a page protector and hanging it on your wall.



These diagrams are tools to help you remember how gallons, quarts, pints and cups are related and how teaspoons and tablespoons are related.

Diagram 1: One way to remember this is to recite “Cup cup pint, pint pint quart, quart quart quart gallon”.

(2 cups to a pint, two pints to a quart, 4 quarts to a gallon)

The G stands for gallon and in one gallon are four quarts, see the 4 Q’s

In each Quart, there are two pints, see the 2 P’s

In each pint there are 2 cups, so we have 2 C’s in each P

If you can think of this image when trying to remember how many cups are in a gallon, for example, you can see there are 16.

The second image is call the Big (Fluid) Ounce [*this part of the slide has animation that forwards on clicking*]

Each small circle at the ends of the large T is a teaspoon – there are 3 teaspoons in a tablespoon. There are two tablespoons in a fluid ounce – which is symbolized by the large O or circle.

Image Sources: Math Principles for Food Service Occupations, 6<sup>th</sup> edition, pages 99 and 101 respectively. The gallon image is credited to Professor Gary Brenenstuhl and the Big Ounce to Kimberly Otis of Schenectady County Community College.



## Fraction To Decimal

### Decimal Equivalents of Commonly Used Fractions

$1/8 = 0.125$	$1/3 = 0.333$	$2/3 = 0.666$
$1/4 = 0.250$	$1/2 = 0.500$	$3/4 = 0.750$
$3/8 = 0.375$	$5/8 = 0.625$	$7/8 = 0.875$

These conversions can quickly be done on a calculator, but if you want to save time, post a chart of common fraction to decimals. If it is something you use frequently, it won't be long before you have them memorized, but it is useful when you have to adjust recipes.



## Abbreviations & Symbols

**Use this chart as a resource to ease written communication and avoid production errors.**

Common Abbreviations and Symbols in Food Preparation

approx.	approximate
tsp or t	teaspoon
Tbsp or T	tablespoon
c	cup
fl. oz.	Fluid ounce
pt	pint
qt	quart
gal	gallon
wt	weight
oz	Ounce
lb or #	Pound (e.g., 3#)

1-49

Discuss slide– make note of any areas that you’ve had an interesting experience with. (Some examples below)

One area that can get confused in handwritten recipes is teaspoon and tablespoon. If I was making a batch of oatmeal, and it called for a ½ of a teaspoon, and I used ½ of a tablespoon--- I’m going to have a salty product.

For the younger social media generation, # is a hashtag used for posting on Twitter. To the more experienced, it’s the POUND sign. (Believe it or not, this has been an issue.)

If you have workers who are more familiar with the metric system (such as most other countries), these measurements will all be new to them.



## Volume Equivalents For Liquids

Volume Equivalents for Liquids

60 drops	1 tsp	
1 Tbsp	3 tsp	0.5 fl. Oz
1/8 cup	2 Tbsp	1 fl. Oz.
1/4 cup	4 Tbsp	2 fl. Oz
1/3 cup	5 Tbsp +1 tsp	2.65 fl. Oz
3/8 cup	6 Tbsp	3 fl. Oz
1/2 cup	8 Tbsp	4 fl. Oz
5/8 cup	10 Tbsp	5 fl oz
2/3 cup	10 Tbsp +2 tsp	5.3 fl.oz
3/4 cup	12 Tbsp	6 fl. Oz
7/8 cup	14 Tbsp	7 fl. Oz
1 cup	16 Tbsp	8 fl. Oz
1/2 pint	1 cup	8 fl oz
1 pint	2 cups	16 fl oz
1 quart	2 pt	32 fl. Oz
1 gallon	4 qt	128 fl oz

I -50

This is a very useful chart. It gives volume equivalents for liquids. Notice the second line, that 1 Tablespoon is 3 teaspoons and both of these volume measures equal 1/2 fluid ounce.



## Weight: Ounces To Pounds

Decimal Weight Equivalents

Ounces	Pounds	Ounces	Pounds
1 oz =	0.06 lb	16 oz =	1.00 lb
2 oz =	0.12 lb	32 oz =	2.00 lb
3 oz =	0.19 lb	35 oz =	2.19 lb
4 oz =	0.25 lb	48 oz =	3.00 lb
5 oz =	0.31 lb	64 oz =	4.00 lb
6 oz =	0.38 lb	71 oz =	4.44 lb
7 oz =	0.44 lb	80 oz =	5.00 lb
8 oz =	0.50 lb	96 oz =	6.00 lb
9 oz =	0.56 lb	106 oz =	6.63 lb
10 oz =	0.62 lb	112 oz =	7.00 lb
11 oz =	0.69 lb	128 oz =	8.00 lb
12 oz =	0.75 lb	141 oz =	8.82 lb
13 oz =	0.81 lb	144 oz =	9.00 lb
14 oz =	0.88 lb	160 oz =	10.00 lb
15 oz =	0.94 lb		

This chart deals with weight. If you do a lot of weighing with an old fashioned scale in your baking area, this might be useful to have around, although, most digital scales will convert between oz and pounds with a quick click of a button.



## FINAL WRAP UP



## Volume Summary

- *FLUID OUNCES are not the same as weight ounces*
- Units: Teaspoon, Tablespoon, cup, pint, quart, gallon, *milliliter, liter*
- Tools: spoons, liquid & dry measures
- Technique:
  - Level dry ingredients, View liquid ingredients
- Use volume for liquids, fruits, vegetables, small amounts

To summarize– Today we reviewed that Volume is different than weight, so fluid ounces (volume) are not the same as weight ounces.

The units that refer to volume are teaspoon, tablespoon, cup, pint, quart, fluid ounce. In the metric system, you will see milliliters and liters as standard volume measures.

To measure volume, you are seeing how much can fit in a container– so we use standard sized spoons, and cups.

To measure dry ingredients, fill the container and level the top. To measure liquid, fill the container and check to see if it comes to the right line.

Use volume for liquids, fruits, vegetables, and small measures.



## Weights Summary

- Units: Pounds, ounces, *grams*, *kilograms*
- Tools: Digital scale, Traditional scale
- Techniques: Tare and weigh
- Use weight for Meats, cheeses, nuts, seeds, and most grain foods.
- More accurate, faster

To summarize, today we reviewed that weights are measured in ounces (NOT FLUID OUNCES), and pound. The metric system uses grams and kilograms.

To measure ingredients in weight, you need a scale— either digital or traditional

To use a scale, you need to tare it— or balance it— before you use it. If you are using some sort of container, tare the scale with the empty container on it.

Weights are more accurate and faster for most ingredients, but are not helpful in production records for fruits and vegetables that require volume measures.



**QUESTIONS?**



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