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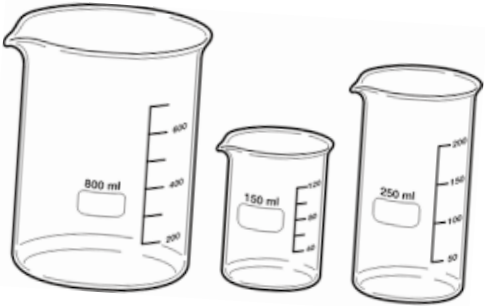
Estimating Metric Measurements

Aligned to the following standards: FFA.PL-A; FFA.PL-C; FFA.PG-J; FFA-CS-M; FFA-CS-N; CCSS.ELA.RI.9-10.1; CCSS.ELA.W.9-10.2; CCSS.ELA.SL.9-10.1.C; CCSS.ELA.SL.9-10.4; CCSS.ELA.RST.9-10.3; CCSS.ELA.RST.9-10.7; CCSS.ELA.WHST.9-10.4; CCSS.ELA.WHST.9-10.2; MP1; MP3; MP6; CRP.02; CRP.04; CRP.05; CRP.06; CRP.07; CRP.08; CRP.09; CRP.11

Directions:

Estimate the value requested for each item listed. Once you have recorded your estimate, you will measure the actual value using the appropriate equipment. Be sure to include the proper measurement symbol (Ex. g=gram, L=liter).

Item	Estimated Value	Actual Value
Length of your arm and hand		
Length of a pencil		
Mass of 1 pencil		
Mass of your shoe		
Volume of a mug		
Volume of a soup spoon		
Temperature of a cup of hot tap water		
Temperature of a beverage from the refrigerator		



Directions:

Answer the following reflection questions.

- For which items were your estimates most accurate? Least accurate?

- Why do you think some measurements were easier than others?

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Metric Units and Converting Recipes

Directions:

Using the information below, and the internet, fill in the blanks with the correct unit (grams or lbs, etc.):

Measurement	Metric System	English System
Mass		
Volume		
Temperature		
Length		

- Calculate the temperature conversions below using the following equations. Round answers to the nearest whole number. Do not use the internet. You must calculate these with a calculator only!
 - How to convert °C to °F: $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times \frac{5}{9}$
 - How to convert °F to °C: $^{\circ}\text{F} = (\frac{9}{5} \times ^{\circ}\text{C}) + 32$

- Boiling point of water: $100^{\circ}\text{C} = \underline{\hspace{1cm}}^{\circ}\text{F}$
- Normal body temperature: $98.6^{\circ}\text{F} = \underline{\hspace{1cm}}^{\circ}\text{C}$
- Average room temperature: $68\text{--}72^{\circ}\text{F} = \underline{\hspace{1cm}}^{\circ}\text{C}$
- Freezing point of water: $0^{\circ}\text{C} = \underline{\hspace{1cm}}^{\circ}\text{F}$
- Common baking temperature: $350^{\circ}\text{F} = \underline{\hspace{1cm}}^{\circ}\text{C}$
- The food "Danger Zone:" $40\text{--}140^{\circ}\text{F} = \underline{\hspace{1cm}}^{\circ}\text{C}$

*Using the "Measuring Reference Charts and Terminology" worksheet you were given, complete the following. Do not Google or otherwise use the internet!

Ingredient	Metric Equivalent (ml)
2 tablespoons milk	
2 cups chocolate chips	
2 $\frac{1}{4}$ cups flour	

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Unit 4 Assessment: Math in Food Science

DIRECTIONS:

Carefully read each question and select the best answer from the options given. Show your work where needed.

- 160°F is considered safe for humans to eat. What would 160°F be in Celsius?
 - 71.1°
 - 75°
 - 69.8°
 - 70.3°
- One gram of fat contains how many kcalories?
 - 10
 - 9
 - 4
 - 6
- A pizza company printed a new package for frozen pizza, and the consumer cooking instructions on the package states that the pizza should be reheated to a final temperature of 77 degrees Celsius. The cooking instructions should have listed the final cooking temperature in degrees Fahrenheit instead of degrees Celsius. You have been asked to convert 77 degrees Celsius into degrees Fahrenheit. What should the final cooking temperature be in degrees Fahrenheit on the label?
 - 135
 - 350
 - 160
 - 171
- To estimate the basal metabolic rate of a women weighing 130 pounds and how much energy she needs to consume for breathing, digesting food, growing new cells and other basic process, first convert her mass to kilograms. Then, calculate the kcalories she would use per hour by multiplying her mass by a BMR factor of 0.9 to learn her BMR. Finally, multiply her BMR by 24 since there are 24 hours/day to find her estimated daily basal kcalorie needs. Her estimated daily basal kcalorie needs would be _____ kcalories/day.
 - 2,808
 - 1,276
 - 1,106
 - 2,071
- You are baking cookies and the recipe calls for the following measurements. You do not have metric measuring devices in your kitchen so you must convert them. Convert the following measurement from ml to U.S. measurements: 120 ml=_____oz.
 - 2
 - 4
 - 6
 - 8
- Thawing a turkey in the refrigerator will take 24 hours for every 4 pounds. If you bought a 19-pound turkey, how many hours/days before Thanksgiving do you need to move the turkey from the freezer to the fridge?
 - 114 hours
 - 4 days
 - 4.75 days
 - 5.66 days

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7. One serving of Sour Cream and Onion Potato Chips is equivalent to 1 ounce. Each serving contains 3 grams of fat, 2.0 grams of saturated fat, 10 mg of cholesterol, 220 mg of sodium, 18 grams of carbohydrates, 1 gram of dietary fiber, 8 grams of sugar and 1 gram protein. One serving is equivalent to how many calories?
 - a. 103
 - b. 93
 - c. 196
 - d. 106
8. There is a pizza in the oven. If the oven is set at 200°Celsius, what is its temperature in Fahrenheit?
 - a. 93.33°
 - b. 255°
 - c. 392°
 - d. 450°
9. A food product developer was asked to develop a ready-to-eat product that would be 6.2 inches long, 1.5 inches wide and 0.5 inches thick. Management wants the volume measurement of the product in metric units, so this would be _____ cm³.
 - a. 4.65
 - b. 23.6
 - c. 11.81
 - d. 76.20
10. For most people, 30% of their calories should come from fat. If Ellen has eaten 2,456 calories today, how many of those calories should have come from fat?
 - a. 81.8 calories
 - b. 736.8 calories
 - c. 1.22 calories
 - d. 73.6 calories
11. How many grams are in a 1 lb. package of Chex Mix?
 - a. 719 g
 - b. 454 g
 - c. 327 g
 - d. 208 g
12. Consumers typically purchase milk in 1-gallon containers, weighing 8.34 lbs. per gallon. If a dairy has 225 cows producing an average of 95 lbs. of milk per day per cow, and cows are milked 2x/day, how many gallons does the farm produce in 1 day?
 - a. 5,126 gallons
 - b. 1,975 gallons
 - c. 2,563 gallons
 - d. 1,139 gallons
13. The mass percent of 15 g of sugar in a solution with 85 g of water is equal to:
 - a. 17.6%.
 - b. 21.4%.
 - c. 4.7%.
 - d. 15%.
14. You are baking a cake that is required to bake at 425°Fahrenheit. What is this in degrees Celsius?
 - a. 118°C
 - b. 200°C
 - c. 218°C
 - d. 325°C
15. Your cake recipe calls for 20 fluid ounces of milk. How many cups of milk do you need?
 - a. 1 cup
 - b. 1 ½ cups
 - c. 2 cups
 - d. 2 ½ cups

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Measuring Reference Charts and Terminology:

*All measurements in food science use metric units.

Metric Base Units		
Type	Name	Symbol
Mass	gram	g
Length	meter	M
Volume	liter	L
Time	second	s
Temperature	degrees Celsius	°C

Metric Prefixes			
Prefix	Symbol	Meaning	Multiplier
Kilo	k	thousand	1,000
hecto	h	hundred	100
deka	da	ten	10

Mass= measure of the quantity of matter

Gram (g)= mass of 1 cubic centimeter of water at 4°C

Kilogram (kg)= mass of 1 liter of water at 4°C; 1 kg=1,000 g

Weight= measure of the force of gravity between two objects; weight changes with location (Example: sea level — Items will weigh less when above sea level.) Mass stays the same regardless of location.

Length= type of measurement; distance between two points; allows you to evaluate the size of objects

Meter= standard unit of length, 1 meter=39.37 inches

Volume= measurement derived from length; amount of space occupied by an object

Liter (L)= metric unit for measuring fluid volume; 1 L=slightly more than 1 quart or 4 cups

degree Celsius (°C)= most commonly used unit in the food science laboratory; is based on the boiling and freezing points of pure water; water freezes at 0°C, boils at 100°C; a Celsius degree is 0.01 of the difference between the boiling and freezing points of water

*How to convert °C to °F: $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$

*How to convert °F to °C: $^{\circ}\text{F} = (9/5 \times ^{\circ}\text{C}) + 32$.



English Measure	Metric Equivalent (These will need to be memorized for the food science CDE)
¼ teaspoon	1 ml
½ teaspoon	2 ml
1 teaspoon	5 ml
1 tablespoon	15 ml
¼ cup	50 ml
1/3 cup	75 ml
½ cup	125 ml
2/3 cup	150 ml
¾ cup	175 ml
1 cup	250 ml