**TEXAS CTE LESSON PLAN**

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| **Lesson Identification and TEKS Addressed** |
| **Cluster**  | Hospitality and Tourism |
| **Course**  | Culinary Arts |
| **Lesson/Unit Title** | Culinary Kitchen Math Calculations |
| **TEKS Student Expectations** | **130.254. (c) Knowledge and Skills**(2) The student applies advanced reading, writing, mathematics, and science skills for the food service industry. (C) The student is expected to calculate numerical concepts such as percentages and estimations in practical situations, including weight and measures(E) The student is expected to read and comprehend standardized recipes(G) The student is expected to calculate and manage food costs |
| **Basic Direct Teach Lesson** |
| **Instructional Objectives** | Students will:* Calculate percentages and estimations in practical kitchen situations
* Calculate food costs
* Use weight and measures in calculations
* Prepare a recipe using a standardized recipe
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| **Rationale** | Understanding, monitoring, and managing yield, food costs and food cost percentages will help you learn the business end of the food industry. Math calculations such as fractions, percentages, weights, and measures are vital to the industry’s “bottom” line – profits. This knowledge may lead to employment in the food industry. Let’s practice some basic culinary math! |
| **Duration of Lesson** | Four 45-minute class periods |
| **Word Wall** | **Cost of goods sold:** The cost of food items sold during a given period; calculated as: food inventory at beginning of food + food purchases – inventory at the end of the period**Cost per portion:** The cost of one serving or saleable unit of food; calculated as: total recipe cost Ã· number of portions**Count:** The number of units or items**Food cost:** The cost of the foods and beverages that go directly into the production of menu items**Food cost percentage:** The percentage of sales that were used to produce the food and beverage items sold during a given period; calculated as: cost of goods sold for a given period Ã· sales for a given period**Recipe cost:** The total cost of all ingredients in a standardized recipe**Recipe yield:** The count, weight, or volume that a standardized recipe will produce**Standardized recipe:** A set of instructions describing the way an establishment prepares a particular dish; standardized recipes vary from one establishment to another**Yield:** Amount of a product that remains after fabrication, for example, usable weight of carrots after peeling and trimming |
| **Materials/****Specialized Equipment Needed** | **Equipment:*** Computer with projector for PowerPoint presentation and videos
* Light projector (Elmo)

**Materials:*** Free Market Activity – Going Bananas
	+ Bananas (10-30 depending on whether you want to provide one each after activity)
	+ Coins (change – real or play)
	+ Pencil/Paper for keeping record of sales
* Measuring Game Activity:
* For each group:
	+ 1/2 teaspoon measure
	+ Container, large filled with water
	+ Cups, clear (5)
	+ Napkins

**Supplies:*** For pumpkin bread:
	+ Equipment:
		- Bread pans
		- Measuring cups
		- Measuring spoons
		- Mixer
		- Mixing bowls
		- Oven
		- Sifter
		- Spatulas
	+ Other equipment as necessary
* Ingredients:
	+ Baking powder
	+ Baking soda
	+ Bread flour
	+ Eggs
	+ Granulated sugar
	+ Ground cinnamon
	+ Pumpkin, canned
	+ Raisins
	+ Salt
	+ Vegetable oil
	+ Water

**PowerPoint:*** Culinary Kitchen Math Calculations
* Presentation Notes – Culinary Kitchen Math Calculations

**Technology:*** Free iPad App:
	+ Fraction Calculator Plus FreeThe best and easiest way to deal with everyday fraction problems.<https://itunes.apple.com/us/app/fraction-calculator-plus-free/id580778301?mt=8>
* TED Talk:
	+ Dan Meyer: Math class needs a makeoverToday’s math curriculum is teaching students to expect — and excel at — paint-by-numbers classwork, robbing kids of a skill more important than solving problems: formulating them. At TEDxNYED, Dan Meyer shows classroom-tested math exercises that prompt students to stop and think.<https://www.ted.com/talks/dan_meyer_math_curriculum_makeover/transcript?language=en>

**Graphic Organizers:*** Culinary Kitchen Equivalents
* Culinary Kitchen Equivalents (Key)

**Handouts:*** Culinary Math Formulas
* Culinary Math Practice
* Culinary Math Practice (Key)
* Free Market Activity – Going Bananas
* Measuring Game Activity
* Pumpkin Bread Formula

Rubric for Pumpkin Bread Lab |
| **Anticipatory Set** | **Before class begins:**It is recommended that you review the Math in Hospitality and Tourism Online Course before teaching this course to become familiar with this section.Review the basics:The foundation for a lesson in culinary kitchen math starts with a quick review in measuring.* Culinary Arts: How to Teach Math & MeasurementsPresented by Dr. Klaus Tenbergen, Director of the Culinology Program at California State University, Fresno.<http://youtu.be/yhrMviXiaQM>

Review handout Free Market Activity – Going Bananas so you will know what to do.As students enter the classroom, hand a few of the students $0.50 in various coins (real or play).Follow the steps in the handout so that students understand costing and supply and demand.The purpose of this activity is to collect data to use when calculating food cost percentages for actual food sales scenarios. The goal is for students to better grasp the concept of cost of goods sold, inventory, purchases, and food cost percentage. This can hopefully be accomplished by having them see these figures calculated in “real time” so to speak.Make sure students are properly recording their sales and purchases.Utilize the data the students have collected to lecture on food cost percentage.Ask student the following questions:* How did you feel when the price of the banana was high?
* How did you feel when the price of the banana was low?
* When the price of the banana was high, did you purchase a banana elsewhere?
* When the price of the banana was low, did you purchase more than one?
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| **Direct Instruction with Special Education Modifications/****Accommodations** | Introduce lesson objectives, terms, and definitions.Distribute graphic organizer Culinary Kitchen Math Calculations Notes so that students may take notes during slide presentation.Introduce PowerPoint Culinary Kitchen Math Calculations and lead a discussion about using math skills in the foodservice industry.View the Khan Academy® video:* Percent word problem example 5Find the number that is expressed as a given percentage.<http://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-fractions-decimals/cc-7th-percent-word-problems/v/solving-percent-problems-3>

Practice the percentages with your students by practicing the problems in the next section:* Discount, tax, and tip word problems <http://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-fractions-decimals/cc-7th-percent-word-problems/e/discount_tax_and_tip_word_problems>

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** Highlight materials for emphasis
* Provide students with vocabulary list with definitions prior to lesson
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| **Guided Practice with Special Education Modifications/****Accommodations** | Distribute the graphic organizer Culinary Kitchen Equivalents and instruct student to complete the sections for the volume amounts.Distribute the handout Culinary Math Formulas and review each of the formulas with the students.Distribute the handout Culinary Math Practice and instruct the students to begin working the problems.Using the light projector, display the handout on the screen and work the problems together as a class so that students may understand the culinary math principles.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** Check for understanding
* Peer tutor
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| **Independent Practice/****Laboratory Experience with Special Education Modifications/****Accommodations** | Distribute the handout Pumpkin Bread Formula and instruct students to read the procedures and gather their ingredients before beginning the lab.Students should show mastery of (in order):* Mise en place
* Proper use of weights and measures
* Mixing and baking

Distribute the handout Rubric for Pumpkin Bread Lab so that students will understand what is expected.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** Encourage participation
* Work with a peer tutor
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| **Lesson Closure** | Review terms, definitions, and objectives.Review handout Measuring Game Activity so you will know what to do.Divide the class into their lab groups and provide them with the instructions on the handout. This activity will reinforce their measuring knowledge. Ask students the following questions:* What are five benefits of proper calculations in the restaurant?
* What are three examples of when using volume measurements would be acceptable?
* What are three examples of when using weight measurements would be acceptable?
* In what ways is kitchen math like math you have done in other classes?
* In what ways is kitchen math different to math you have done in other classes?
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| **Summative/End of Lesson Assessment with Special Education Modifications/****Accommodations** | Students will be assessed with appropriate rubric.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** Praise participation
* Opportunity to respond orally
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| **References/****Resources** | **Textbook:*** Labensky, Sarah R. *Applied Math for Food Service.* (1998). Upper Saddle, New Jersey: Prentice Hall.
* *Culinary essentials.* (2010) Woodland Hills, CA: Glencoe/McGraw Hill.
* *Foundations of restaurant management & culinary arts.* (2011). Boston: Prentice Hall.

**Videos:*** Percent word problem example 5Find the number that is expressed as a given percentage.<http://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-fractions-decimals/cc-7th-percent-word-problems/v/solving-percent-problems-3>
* Discount, tax, and tip word problems <http://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-fractions-decimals/cc-7th-percent-word-problems/e/discount_tax_and_tip_word_problems>
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| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** | * Add terms and definitions to personal dictionary
* Journal entries
* Utilize Four Corners Vocabulary/Word Wall Activity
* Word wall
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| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** |
| **Reading Strategies** | Other articles pertaining to this lesson students may read include:* Kitchen Math Through the AgesWhen I first started homeschooling my children, well-meaning friends and family would panic when I explained that my approach to math involved cookies. <http://www.rosettastone.com/homeschool/articles/kitchen-math>
* Philadelphia library cooks up culinary literacyWhat’s cooking at the Philadelphia public library? Plenty, now that it has a million-dollar kitchen at its main downtown branch.<http://www.postandcourier.com/article/20140713/PC1207/140719769>
* Why Is Mathematics Important in Culinary Arts? Surprisingly, mathematics plays an important role in the culinary arts. There are helpful tools, such as measuring cups, measuring spoons and scales, to aid in food preparation.<http://everydaylife.globalpost.com/mathematics-important-culinary-arts-15421.html>

Reading strategy: Encourage students to make notes, sketches, and write numbers on scratch paper when reading about calculations in the kitchen or when solving word problems. |
| **Quotes** | When I cook with my son, I might chop vegetables and have fun with different shapes. Cooking is a way to teach kids about other things, like reading or math with all of the weights and measures. There are so many things that are part of cooking that are also very educational. **-Emeril Lagasse**There’s no reason to stereotype yourself. Doing math is like going to the gym – it’s a workout for your brain and it makes you smarter. **-Danica McKellar**I was good at math and science, and I got lots of degrees in lots of things, but in a parallel universe, I probably became a chef.**-Nathan Myhrvold**I tell students that even if they don’t like math right now, they can use math as a brain-sharpening tool – a tool that not only builds the foundation for a great career, but that also builds self-confidence, no matter what they choose to do with their lives.**-Danica McKellar**Cooking and gardening involve so many disciplines: math, chemistry, reading, history.**-David Chang** |
| **Writing Strategies** | **Journal Entries:*** At home, when I need to do calculations in the kitchen, I …
* I hate/love math because …
* The easiest/hardest part about kitchen math is …
* Recipe conversions are easy/difficult because …

**Writing Strategies:**RAFT writing strategy is designed to demonstrate student understanding of material in a creative and relevant way.* + Role – restaurant owner
	+ Audience – current employees
	+ Format – flyer
	+ Topic – properly converting recipes

The flyer will highlight shortcuts and/or calculation hints for employees to use in the kitchen. |
| **Communication 90 Second Speech Topics** | * Do you think basic math should be taught in grade school or should younger students only be taught to use calculators? Defend your answer.
* I think it’s important to be great at math in the kitchen because …
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| **Other Essential Lesson Components** |
| **Enrichment activity** | Purchasing terminology can be a little confusing to those just entering the industry. Calculations such as these often require a basic understanding of purchasing terminology and acronyms.Seek a foodservice vendor salesperson from a company such as Sysco, Ben E. Keith, or U.S Foodservice to do a demonstration on purchasing terminology and acronyms. Work with this person to develop an activity for your students. Students may practice their math skills with the Culinary Arts Math Assessment Problems:* Hospitality and Tourism Culinary Arts Math Assessment Problems.

**TED Talks:**TED is a nonprofit organization devoted to spreading ideas, usually in the form of short, powerful talks (18 minutes or less).The video below is related to this lesson. Allow students to view the video and lead a discussion concerning the TED Talk.* Dan Meyer: Math class needs a makeoverToday’s math curriculum is teaching students to expect — and excel at — paint-by-numbers classwork, robbing kids of a skill more important than solving problems: formulating them. At TEDxNYED, Dan Meyer shows classroom-tested math exercises that prompt students to stop and think.<https://www.ted.com/talks/dan_meyer_math_curriculum_makeover/transcript?language=en>
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| **Family/****Community Connection** | Bring a family recipe from home and create a standardized recipe to serve 4, 8, and 50 using the handout Parts of a Recipe from the lesson Recipe for Success: Breaking Down a Recipe. Students may share their family recipe with the class. |
| **CTSO connection** | **Family, Career, Community Leaders of America (FCCLA)**<http://www.texasfccla.org>* Culinary ArtsA team event – recognizes participants enrolled in occupational culinary arts/food service training programs for their ability to work as members of a team to produce a quality meal using industrial culinary arts/food service techniques and equipment.
* Applied Math for Culinary ManagementAn individual or team event, recognizes participants who use Family and Consumer Sciences skills to demonstrate the application of mathematical concepts in the culinary arts industry.
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| **Service Learning Projects** | Successful service learning project ideas originate from student concerns and needs. Allow students to brainstorm about service projects pertaining to lesson. For additional information on service learning see:<http://www.ysa.org>Example: Have students volunteer with elementary (or younger) aged students to teach them math through culinary arts. This could include learning patterns by making fruit-kabobs with pre-K aged students or learning measuring and adding fractions with elementary students. |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)